Ireland's Forests - Annual Statistics

2014

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The Forest Service of the Department of Agriculture, Food and the Marine is responsible for ensuring the development of forestry within Ireland in a manner and to a scale that maximises its contribution to national socio-economic well-being on a sustainable basis that is compatible with the protection of the environment. Its strategic objectives are:

1. To foster the efficient and sustainable development of forestry;
2. To increase quality planting;
3. To promote the planting of diverse species;
4. To improve the level of farmer participation in forestry;
5. To promote research and training in the sector;
6. To encourage increased employment in the sector.

The Forest Service supports the forestry sector through a range of incentives to:

1. support afforestation using a range of tree species,
2. facilitate the development of the processing sector;
3. train forest owners to manage their forests.

1 Introduction

The Forest Service has the responsibility for the collection and publication of forest statistics.

Forest stakeholders and policy makers require reliable statistics upon which to plan and make decisions. Ireland also has a series of international reporting requirements relating to forests and forestry. These include the United Nations Framework Convention on Climate Change (UNFCCC) for carbon stocks and stock changes, the Decision 529/2013/EU on land use, land-use change and forestry, the Food and Agriculture Organisation (FAO) for series of forest related data including the Global Forest Resource Assessment, EUROSTAT, FAO, ITTO and the United Nations Economic Commission for Europe (UNECE) for wood harvest and trade data, (the Joint Forest Sector Questionnaire), the Joint Wood Energy Enquiry of the UNECE, IEA, FAO and the European Commission in respect of forest health.

An annual forest statistics report had been published by the state since its foundation up to 1988, but was discontinued thereafter. This publication reinstates annual reporting on the forest estate and forest industry and brings together previously published and new statistics into a single publication.

Forest Service data revision and correction policy
While every effort is made to ensure the accuracy of data provided, amendments can occur as new data become available or errors are detected and corrected. These changes will appear in following year where possible.

Release date: 1st November 2014

Geographical Breakdown: County (Where Possible)

Issued by: Forest Service

Website: http://www.agriculture.gov.ie/forestservice/

2 Forest Area

2.1 Introduction

This chapter contains statistics on:

- Irish forest area and area changes over time;
- Forest ownership;
- Tree species composition;
- Age structure of the forest estate.

Key Facts

- The area of forest is estimated to be 731,650 ha or 10.5% of the total land area of Ireland (NFI 2012);
- Forest cover is estimated to be at its highest level in over 350 years;
- Of the total forest area, nearly 396,000 ha or 54.1% is in public ownership, mainly Coillte[1];
- The forest estate is comprised of three quarters conifers and one quarter broadleaves;
- Nearly three quarters of the stocked forest area is less than 30 years of age.

[1]Coillte is a State owned company operating in forestry, land based businesses and added-value processing operations. The company was established as a private limited company under the Forestry Act 1988 which set out its objectives and duties. The company's shareholders are the Minister for Finance and the Minister for Agriculture and Food.

2.2 Forest definition

Forest is defined as land with a minimum area of 0.1 ha under stands of trees 5 m or higher, having a minimum width of 20 m and a canopy cover of 20% or more within the forest boundary; or trees able to reach these thresholds *in situ*. The forest definition relates to land use rather than land cover, with the result that open space within a forest boundary either permanently or temporarily unstocked with trees, along with felled areas that are awaiting regeneration, are included as forest.

2.3 Forest area

In 2012, the National Forest Inventory (NFI) estimated that the area of forest was 731,650 hectares or 10.5% of the land area, excluding inland water bodies (Table 1 and Figure 1). Of the total forested area, 653,980 ha comprises areas occupied by trees or potentially occupied by trees, while permanently unstocked open area within the forest (roads, ridelines, powerlines, etc.) comprise 77,670ha (Table 1). Conifers account for 68.6%, broadleaves 17.5% and mixed forests 13.9% of the stocked forest area.

Table 1 Forest Area 2012

Land use category	Area (ha)	% of total land area
Forest	653,980	9.5
Forest open area	77,672	1.0
Total	**731,652**	**10.5**

2.4 Trees & scrub outside of forest and other wooded land

The NFI also records information about three other land-use types that do not reach the forest definition thresholds; scrub[2], hedgerows and Other Wooded Land. The combined area of these categories is 402,199 ha or 5.8% of the total land area (Table 2).

Table 2. Trees & scrub cover outside of forests 2012

Land use type	Area (Ha)	% of total land area
Scrub	82,606	1.2
Hedgerow	271,912	3.9
Other wooded land	47,681	0.7
Total	**402,199**	**5.8**

[2] Scrub refers to vegetation types where the dominant woody elements are shrubs (woody perennial plants), reaching a height of more than 0.5 m and less than 5 m in height at maturity and without a definite stem and crown.

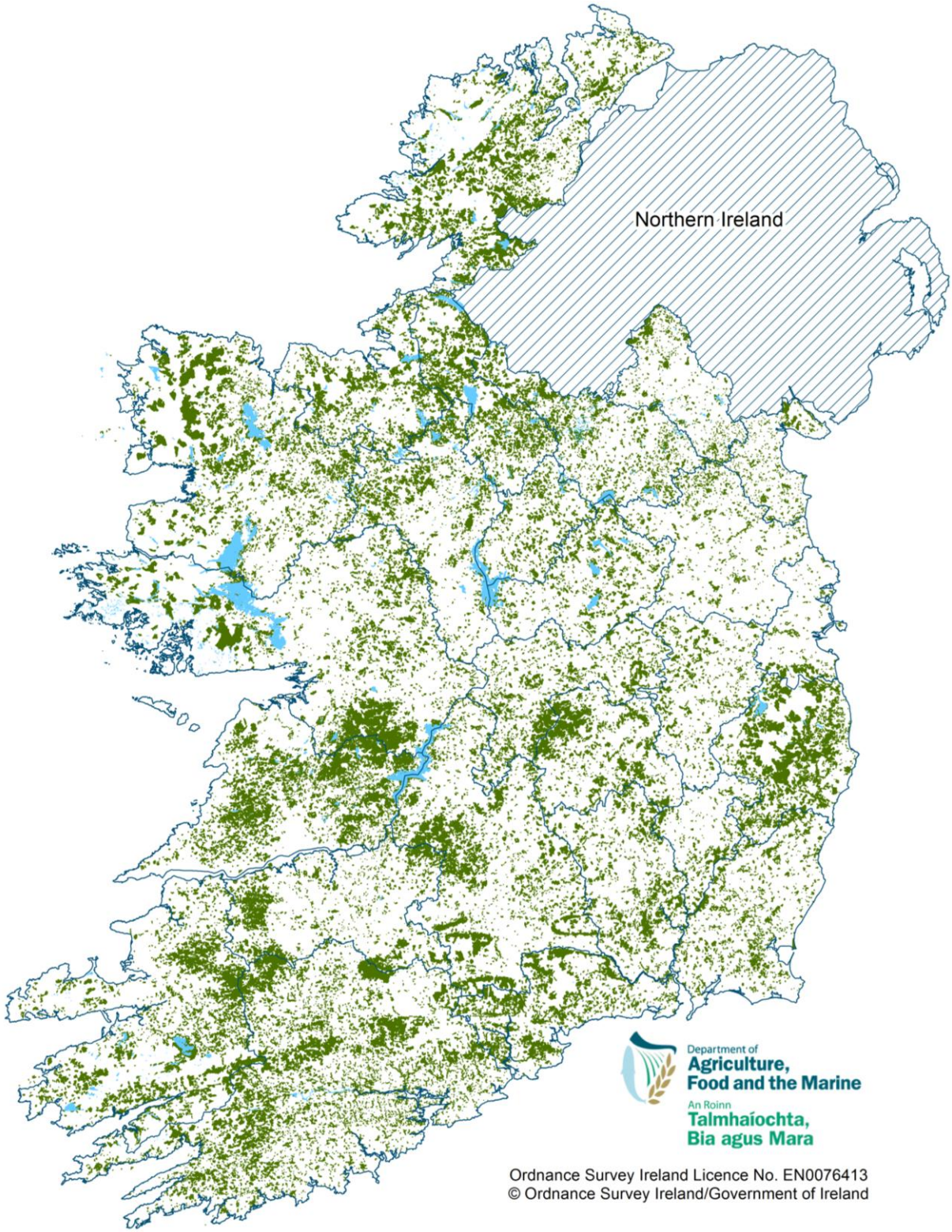

Figure 1. Ireland's forest estate 2014.

2.5 Forest area changes over time

The 731,650 ha of forest in Ireland in 2012 represents 10.5% of the total land area. The changes in forest cover in Ireland since 1656 are indicated in Table 3 and Figure 2. All estimates prior to 1918 relate to the whole of the island of Ireland, thereafter estimates are for the Republic of Ireland only. A 1905 forest cover estimate for the province of Ulster was 15,000 ha, but overall on the island of Ireland forest cover was still declining up to 1928.

Since the foundation of the State the area of land under forest in Ireland has grown from 1.4% of the land area, to the current 10.5%. Figure 3 shows the growth in area of both public and private forests over this period. Three inventories of the private forest estate have taken place: 1973, 2006 and 2012. The area of privately- owned forests has increased from 81,958 ha in 1973 to 335,900 ha in 2012; over a four-fold increase. Over the same period the state-owned forest area has also significantly increased from 242,056 ha to 395,760 ha.

Table 3. Forest area in Ireland

Year	Area (ha)	% of Total Land Area
1656[3]	170,000	2.5
1841[4]	140,000	2.0
1908[5]	125,200	1.8
1918[6]	100,717	1.4
1928[7]	89,000	1.2
1949[8]	144,000	2.1
1965[9]	254,350	3.7
1973[10]	323,654	4.6
1985[11]	411,529	5.9
2006[12]	697,730	10.1
2012[13]	731,650	10.5

[3] Rackham, O.1986. *The History of the Countryside*. Dent & Sons Ltd., London.
[4] Aalen, F.H.A, Whelan K. And Stout M. (Eds). 1997. *Atlas of the Irish Rural Landscape*. Cork University Press
[5] Dept. Of Agriculture & Technical Instruction. 1908. *Report of the Departmental Committee on Irish Forestry*. A. Thom & Co., 1908.
[6] Dept. of Agriculture. 1926. *Forest Lands and Timber Supply in the Irish Free State*. Proceedings of the First International Congress on Sylviculture, Rome, 1926.
[7] Minister for Lands & Agriculture. Dail Eireann, Volume 23, 3rd May 1928.
[8] Estimate generated from Annual Report of the Department of Agriculture 1943/49.
[9] Estimate generated from Annual Report of the Department of Agriculture 1964/65.
[10] Estimate generated from Purcell, T.J, 1973. *Inventory of Private Forests -1973*.Department of Fisheries and Forestry and Annual Report of the Department of Agriculture 1972/73.
[11] Estimate generated from Annual Report of the Department of Agriculture 1985.
[12] *National Forest Inventory Republic of Ireland Results*. 2007. Forest Service, Department of Agriculture Fisheries and Food.
[13] *National Forest Inventory Republic of Ireland Results*. 2013. Forest Service, Department of Agriculture Food and the Marine.

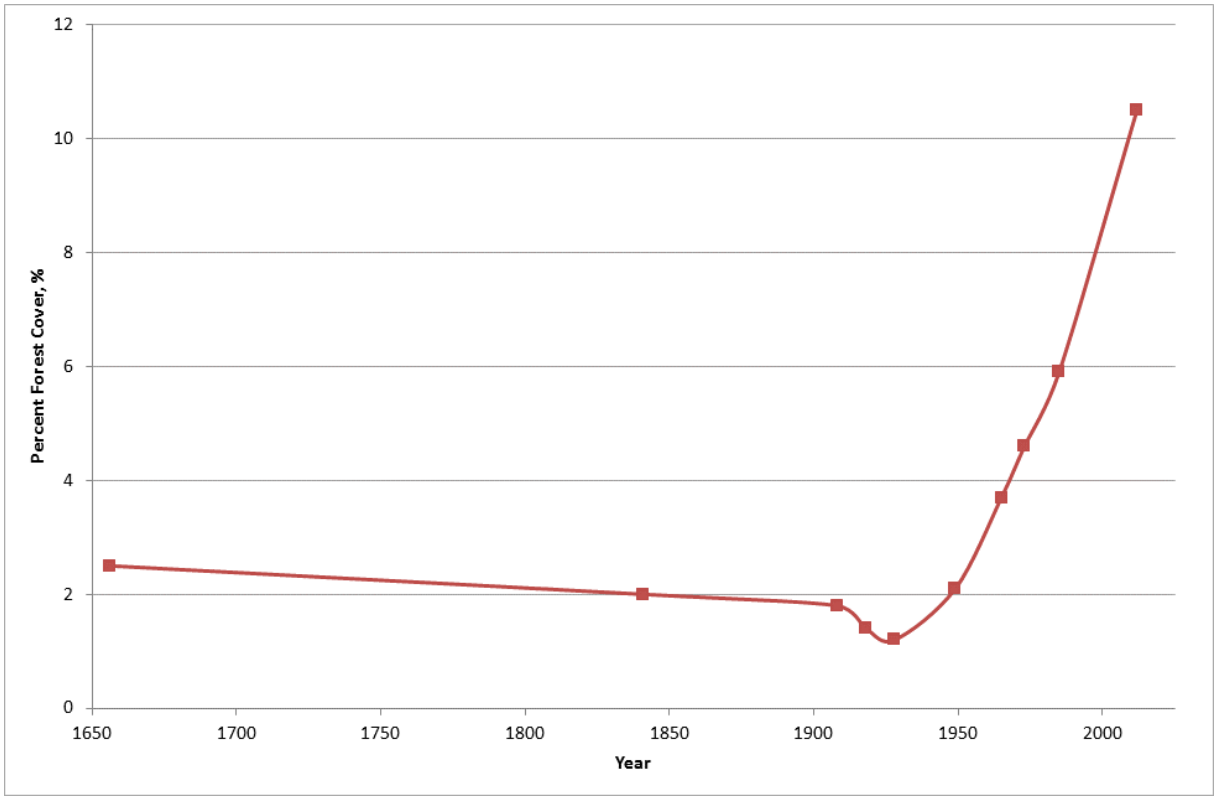

Figure 2. Forest cover, 1656-2014.

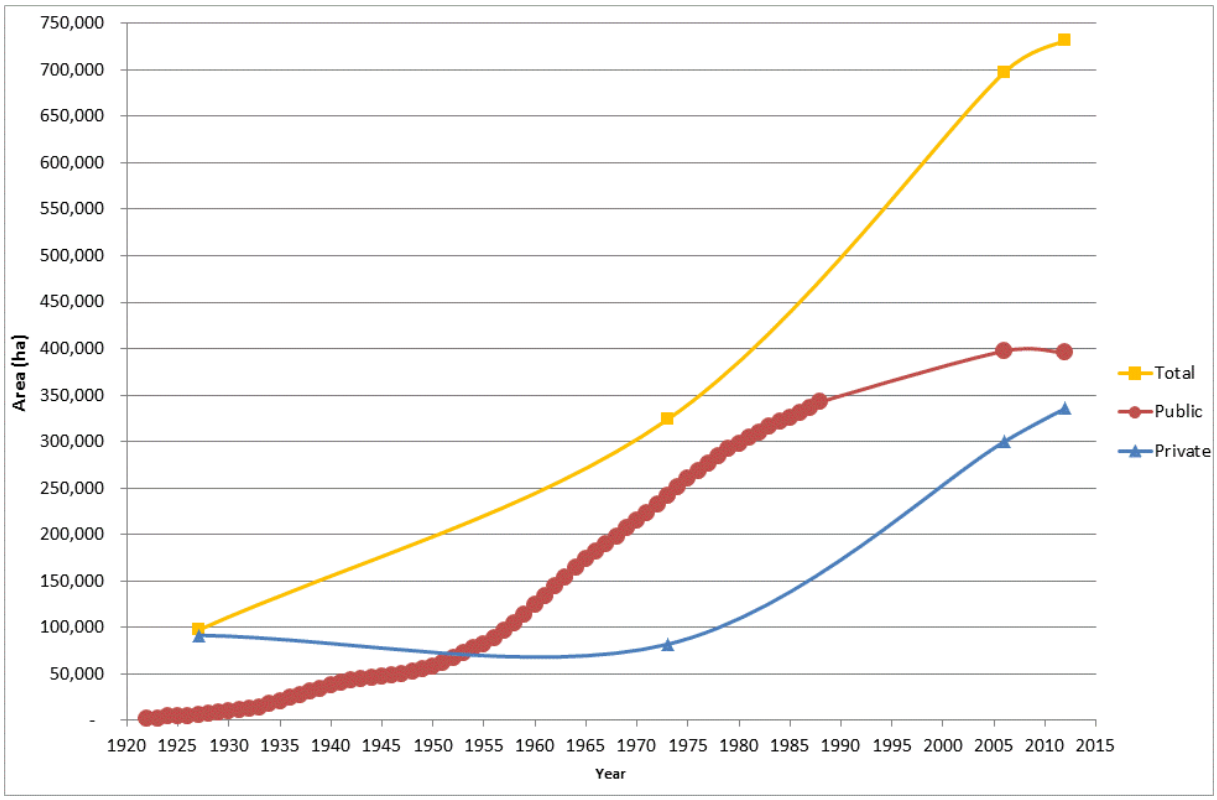

Figure 3. Forest area change since the foundation of the State, 1922-2014.

2.6 Forest Ownership

Within the national forest estate there are three main forest ownership categories:

1. **Public**: all state owned forests, mainly Coillte;
2. **Private (grant aided)**: private afforested land which was in receipt of either grant and/or premium since 1980;
3. **Private (other)**: private forests not in receipt of grant-aid post 1980.

In 2012, 54.1% of forests were in state ownership, a reduction from 57% in 2006 (primarily due to private sector afforestation in the intervening period). Of the public forest area (Table 4), the total forest area of 395,760 ha comprises 359,320 ha of stocked forest land and 36,440 ha of forest open area. Of the public forests Coillte owns 337,300 ha, or 93%.

Table 4. Forest ownership in Ireland (Source: NFI, 2012)

Ownership	**Area (ha)**	**%**
Public	395,760	54.1
Private (grant aided)	246,550	33.7
Private (Other)	89,350	12.2
Total	**731,650**	**100**

2.7 Species composition

Sitka spruce is the most common species, occupying 52.4% of the forest area (Table 5). Over one quarter of the forest estate contains broadleaves. Of the broadleaves 54.5% are 'Other broadleaf species' (both long living and short living), of which over half are willow[14]. The next largest broadleaf species group was birch species (22.7%), ash (12.5%), followed by oak (10.2%).

The interpretation of stocked areas of individual species presented in Table 5 needs to be carefully considered since many forests contain an intimate mixture of species. Methods are used to apportion the constituent individual species from these intimate mixtures into the total area covered by the forest. The total stocked area of a given species therefore does not represent distinct areas of land covered by pure stands of the species, but represent the areas of mixed forest apportioned to them.

[14] For most NFI statistical outputs, it was more convenient to work with the species groups than with individual species. The data would not have been sufficiently representative if processed by species. The species group composition of long living broadleaves are as follows: field maple, maple, horse chestnut, strawberry tree, hornbeam, sweet chestnut, holly, notofagus sp., white poplar, black poplar, Turkey oak, red oak, whitebeam, small-leaved lime, large-leaved lime, wych elm. The species group composition of short living broadleaves are as follows: crab apple, aspen, cherry, blackthorn, goat willow, other willows, mountain ash, and hazel.

Table 5. Tree Species Composition (Source: NFI, 2012)

Species	Area (ha)	%
Sitka spruce	334,560	52.4
Norway spruce	26,340	4.1
Scots pine	8,010	1.3
Other pine spp.	61,950	9.7
Douglas fir	10,380	1.6
Larch species	27,740	4.4
Other conifers	3,850	0.6
Pedunculate and sessile oak	16,840	2.6
Beech	9,500	1.5
Ash	20,610	3.2
Sycamore	9,250	1.5
Birch spp.	37,370	5.9
Alder spp.	15,080	2.4
Other short living broadleaves	46,220	7.3
Other long living broadleaves	9,440	1.4
Total	637,140	100

2.8 Forest age

Just under three quarters of the national forest estate consists of trees of 30 years old or less (Figure 4). Conifers tend to have a shorter rotation than broadleaves; 91.5% of conifers are 30 years old or less while 74.4% of broadleaves are 30 years old or less. The age structure of the national forest estate differs according to ownership: public and private grant-aided categories have 90.9% of forests aged 30 years or less ; while the Private Other category has 47.7% forests aged 31 years and more (Figure 4).

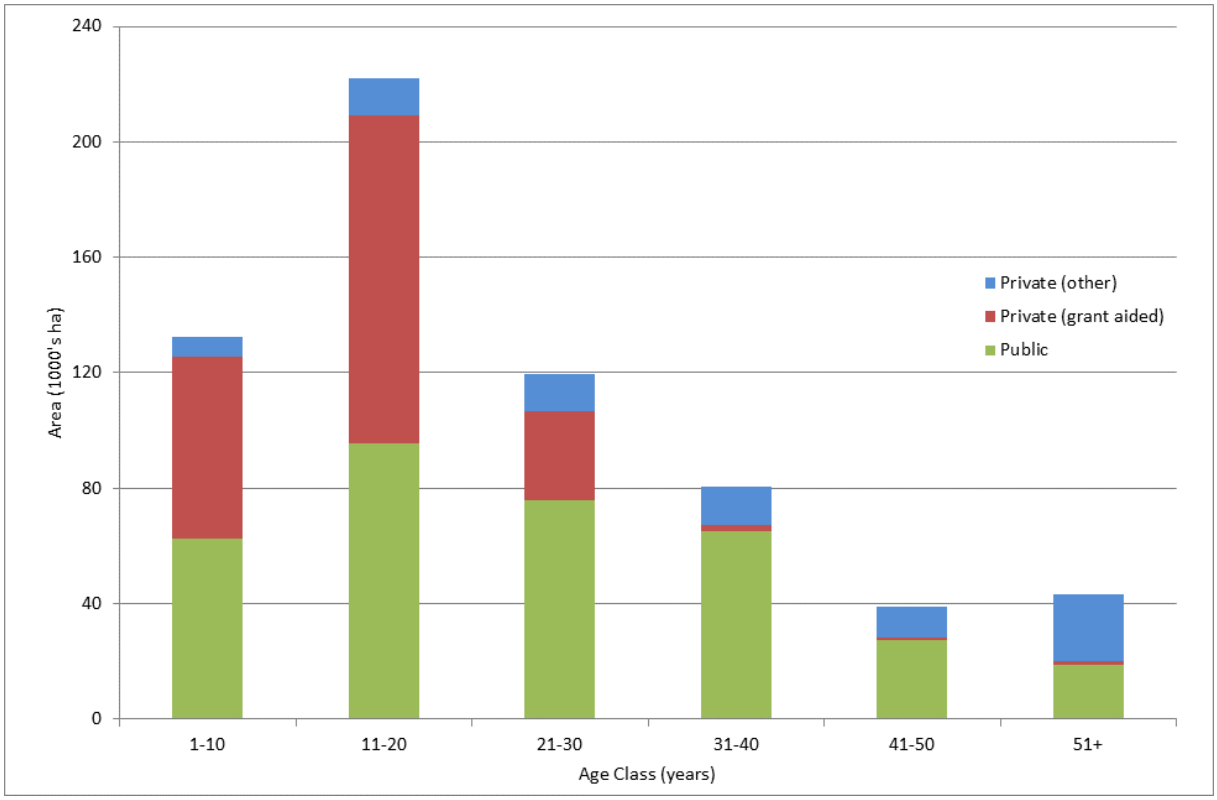

Figure 4. Forest age-class distribution by ownership (Source: NFI, 2012).

3. Afforestation

This section provides information on afforestation levels since the foundation of the State, with a particular emphasis on private afforestation since 1980.

3.1 Introduction

This chapter provides information on:

- Species composition of afforestation;
- Forest size and number of private grant aided afforestation since 1980;
- Ownership and forest size patterns of private grant-aided afforestation since 1980;
- Ownership patterns of private forests established prior to 1980.

Key statistics

- State afforestation was relatively low up until the 1950s, but thereafter increased up to the year 2000;
- Private afforestation came to the fore in the mid-eighties: nearly 270,000 ha of private forests were established between 1980 and 2013;
- The proportion of broadleaf afforestation significantly increased after 1993, and up to the present, comprising 23% of all afforestation since that year;
- Tree diseases such as Phytophthora ramorum (mainly larch) and Chalara fraxinea (ash) may influence species diversity into the future;
- 85% of private forest owners are classified as farmers;
- 83% of the forests afforested since 1980 have been planted by farmers;
- The average size of private grant-aided afforestation since 1980 is 9.1 ha;
- Since 1980, nearly 20,000 unique private forest owners have received grant aid to establish forests;
- Nearly half of all individual owners have received afforestation grant aid at least twice since 1980, which should contribute to management efficiencies .

3.2 Afforestation 1922-2013

As shown in Table 2, forest cover on the island of Ireland continued to decline up to 1928. With the introduction of the first Forestry Act in 1928 the decline of forest area was largely halted. However afforestation levels remained relatively low right up until the 1950s. The level of state afforestation dramatically increased from the 1950s up to 2000, after which state planting declined to a negligible level. One critical factor was the decision by the European Commission in August 1999 that Coillte Teoranta was not entitled to receive annual [non-farmer] forest premiums. The European Court of Justice (ECJ) subsequently upheld this decision. In the 10 years from 1990 to 1999, 43% of all afforestation was on Coillte land. As a result, Coillte reviewed its planting programme and has not engaged in afforestation to any appreciable extent since the ECJ decision.

Private afforestation came to the fore in the mid-80s following the introduction of a grant and particularly an annual premium scheme for afforestation. Long-run afforestation trends, including the change from state-led to private-led grant-aided afforestation in the 1980s and 1990s, are shown in Figure 5.

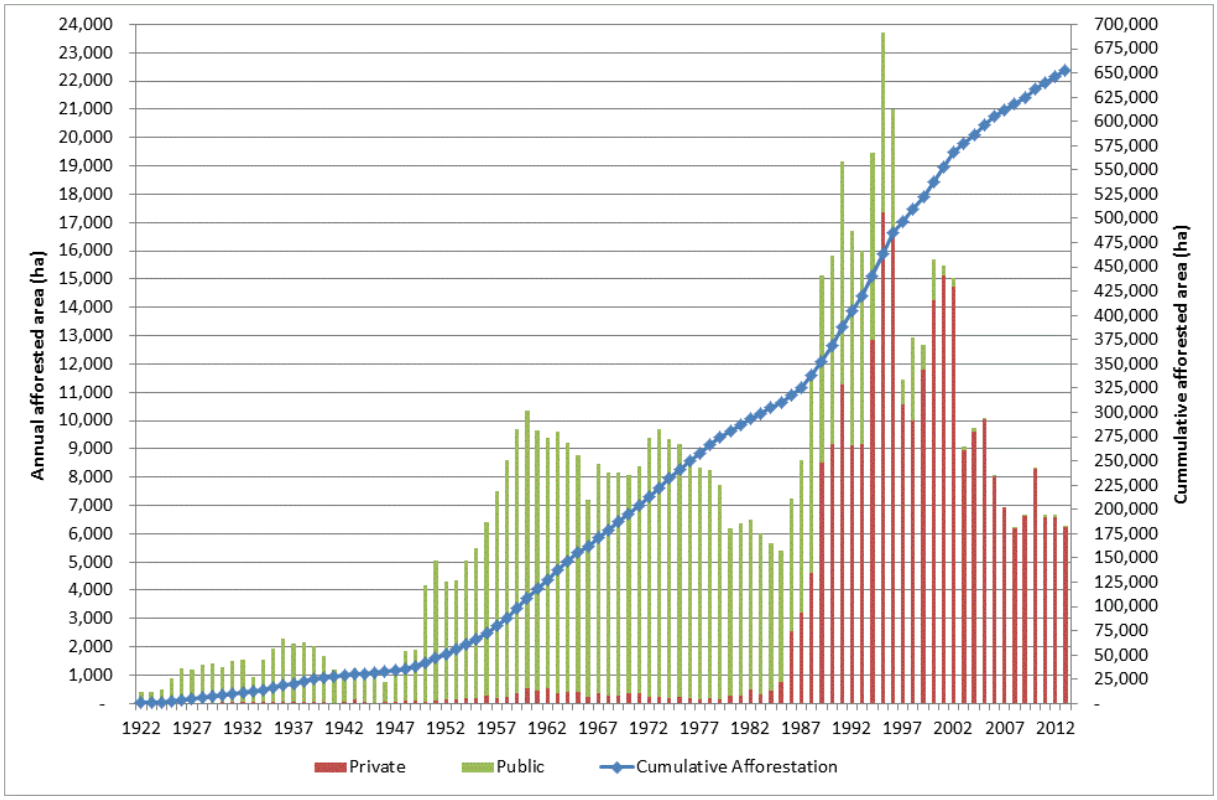

Figure 5. Annual state and private afforestation 1922-2013.

Afforestation, conifers: broadleaves, averaged 90:10 during the 1930s and 1940s. Thereafter, up to the early 1990s, broadleaves comprised 4% of afforestation. As a result of the positive differential in favour of broadleaf species in both the afforestation grant and premium schemes the proportion of broadleaves planted significantly increased from 1993 up to the present, with an average of 23% broadleaves planted since that year.

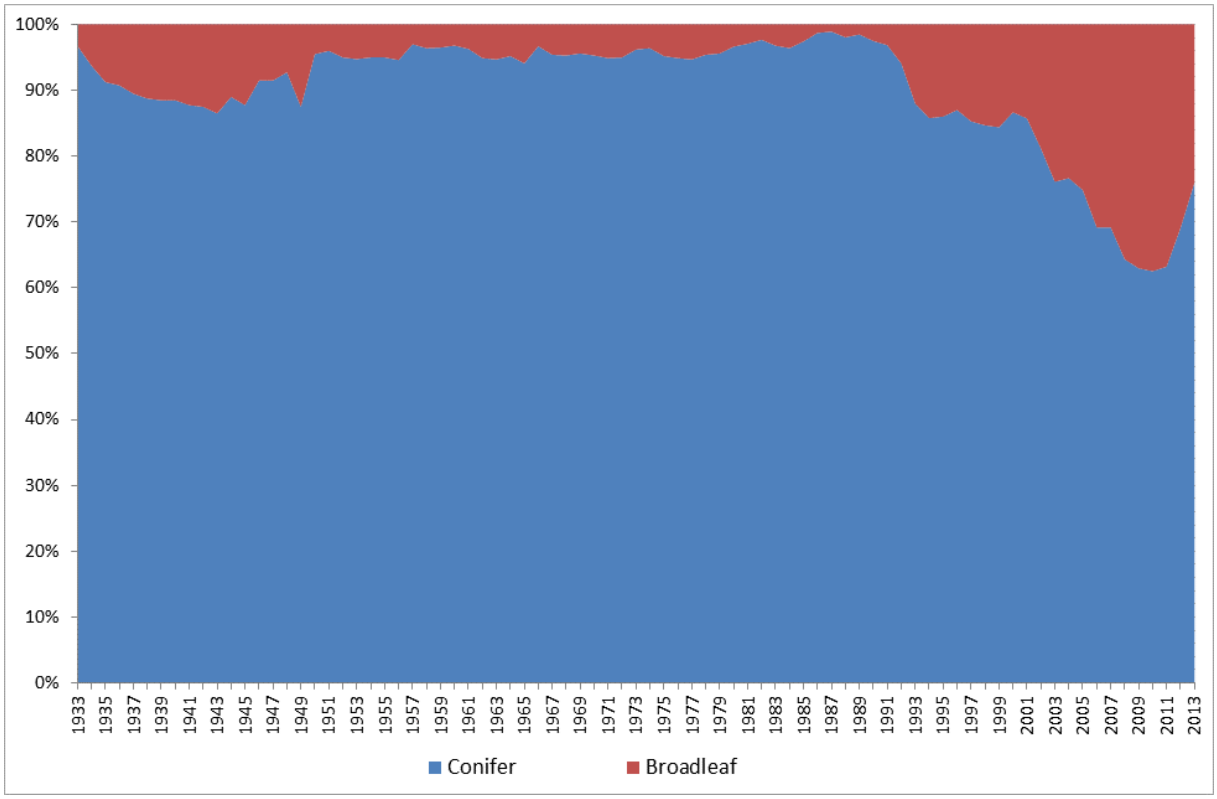

Figure 6. Conifer - broadleaf afforestation 1933-2013.

A range of conifer species were planted in the 1930s and 1940s, including Norway spruce, Scots pine and larch, along with Sitka spruce and Lodgepole pine. This reflected the untested nature of the North American species being planted at the time. From the 1950s onwards confidence in Sitka spruce and Lodgepole pine grew, leading to their dominance in afforestation up to the mid-90s, after which the role of Lodgepole pine declined, reflecting primarily the improved land quality available for afforestation after this period (Figure 7) and the generally poor form of the species.

From 2006 to 2010 the species composition of afforestation remained largely stable. However the finding of *Phytophthora ramorum* in Japanese larch in 2010, led to its withdrawal from the afforestation programme (Figure 8). From the mid-90s onwards a wider range of tree species has been planted, with ash and oak dominating broadleaf planting. However, more recently, the fungal disease *Chalara fraxinea* was found in ash in 2012, resulting in the cessation of grant aid for this species. Nearly 17,000 ha of ash have been planted since 1990 (Figure 9).

Sitka spruce remains the predominant species used in Irish forestry. It has proven to be one of the most productive conifers in Ireland and as such has become the mainstay in roundwood processing.

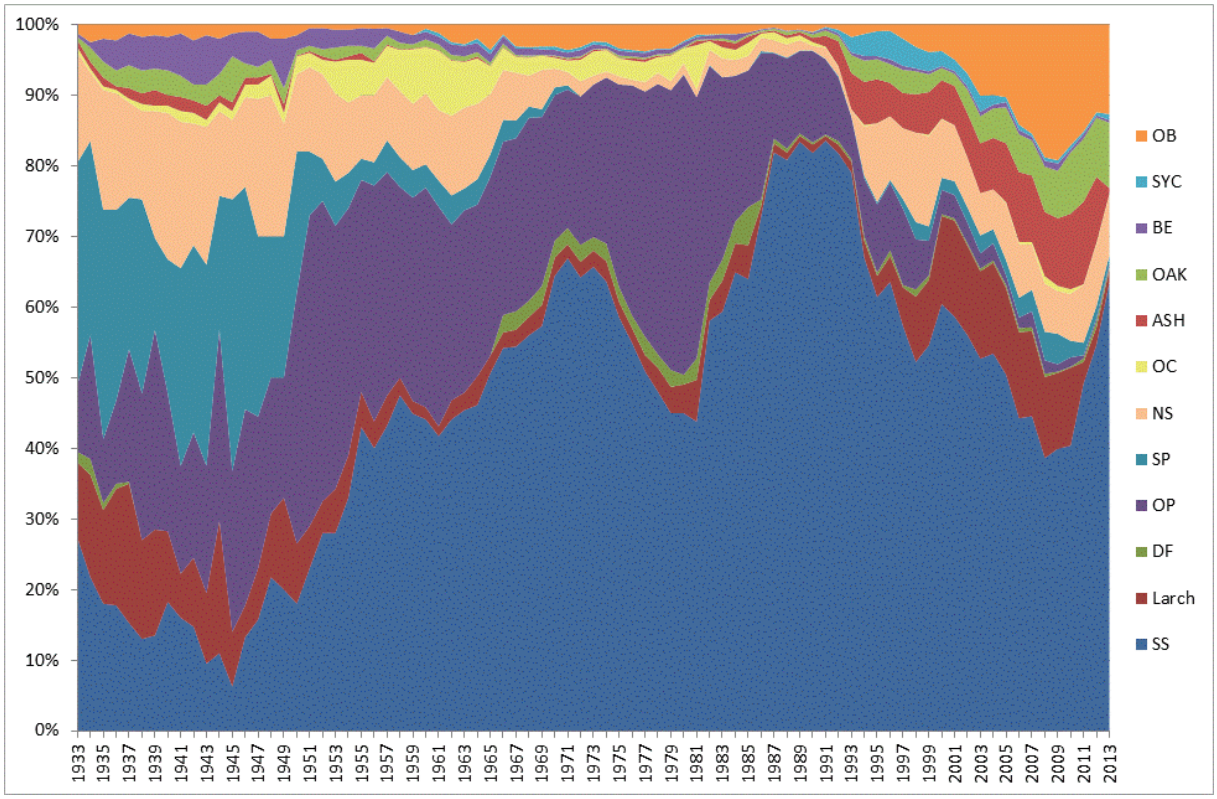

Figure 7. Species groups used in afforestation 1933-2013[15]

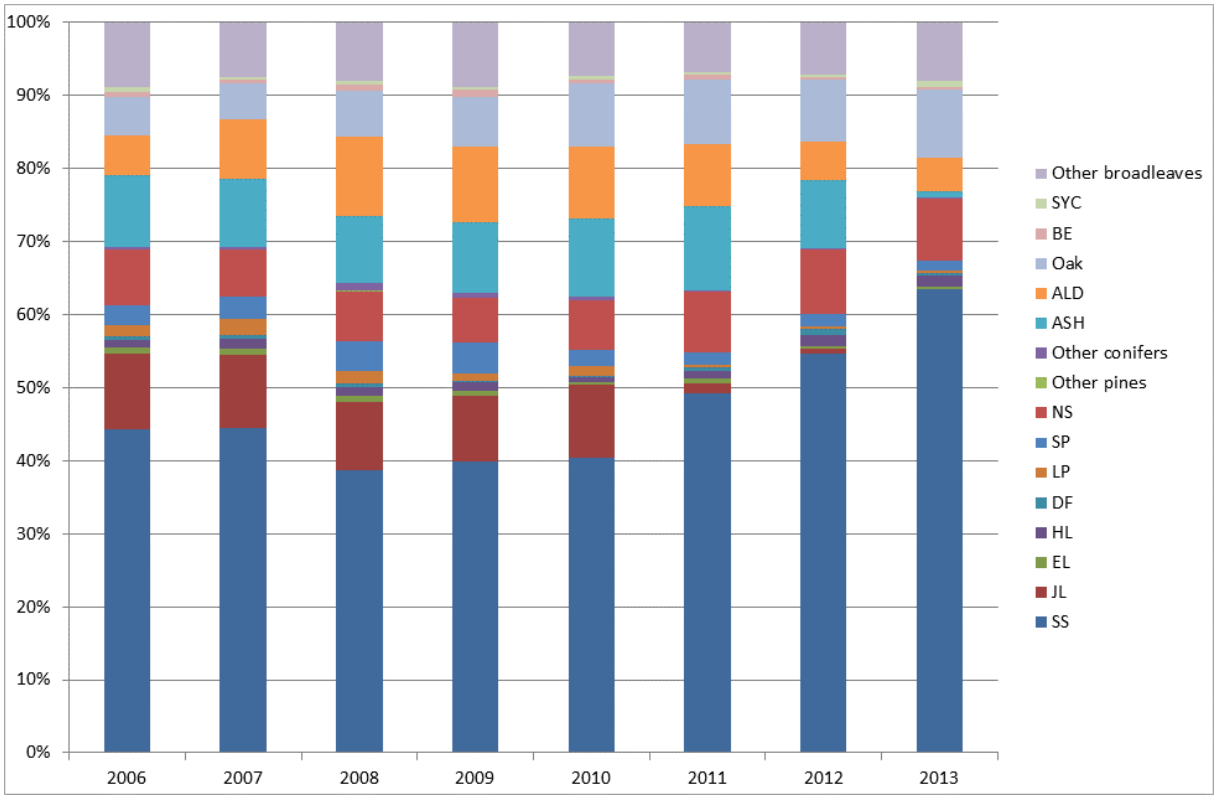

Figure 8. Grant-aided species groups, 2006-2013

[15] Legend Key :OB= Other Broadleaves, SYC = Sycamore, BE = Beech, Oak= Pedunculate and Sessile Oak, Ald= Alder, NS= Norway spruce, SP = Scots pine, LP = Lodgepole pine, DF = Douglas fir, HL = Hybrid larch, EL = European Larch, JL = Japanese larch, SS = Sitka spruce.

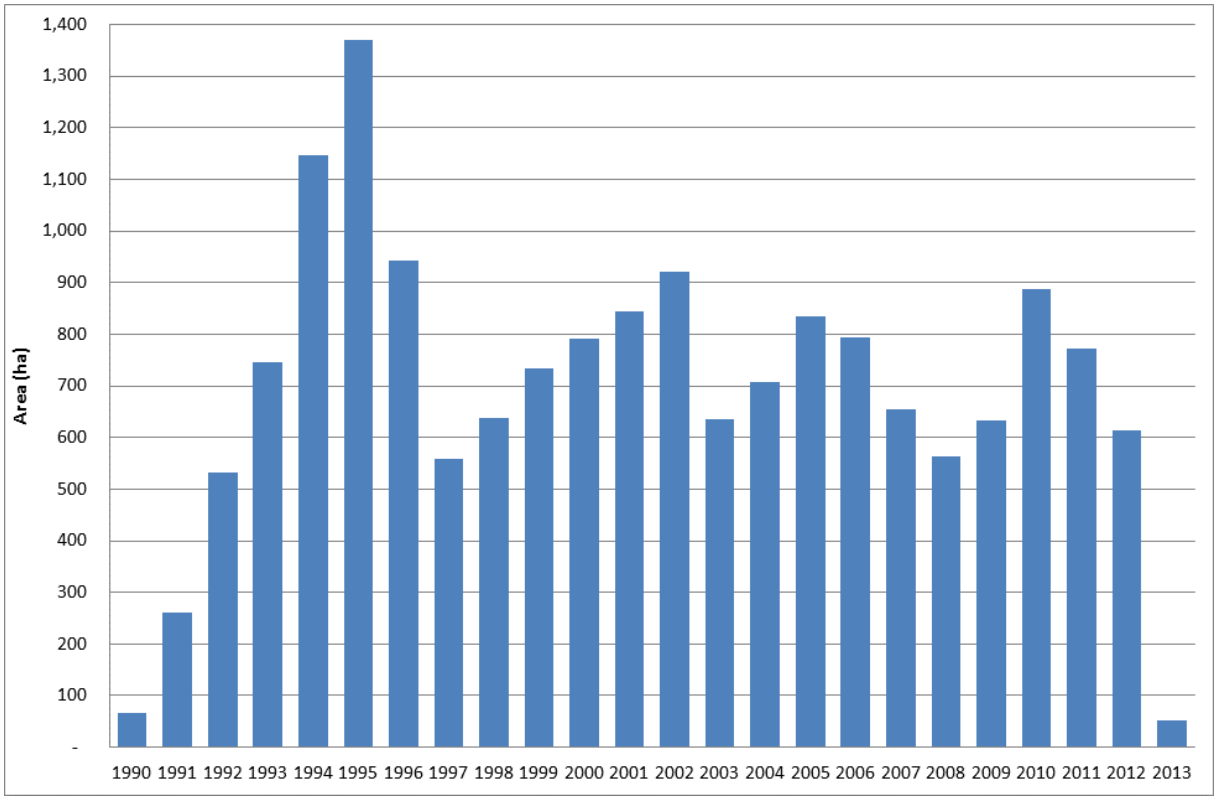

Figure 9. Ash afforestation 1990-2013.

3.3 Private lands afforested, forest size and number

This section provides statistics of private lands afforested over the period 1980 to 2013. The average size of private grant-aided afforestation since 1980 to 2013 was 9.1 ha (Table 6). From 1980 up to the mid-80s the average afforestation parcel was relatively small at 5.9 ha. With the introduction of the grant and premium scheme average afforestation increased to 9.6 ha.

A significant proportion of private afforestation in the 90s was "whole farm" planting and planting on unenclosed land. By 2013 the average area afforested has decreased to 6.6 ha as a result of planting mostly within individual agricultural holdings and a movement away from unenclosed land.

In terms of the size class contribution to overall afforestation since 1980, the distribution is slightly skewed towards parcels of 10-30 ha; over a wide range from 0.1 ha to over 100+ ha (Figure 10). Figure 11 shows that large sized individual plantings were a feature of mid-80s - late 90s planting, with 49% of individual forests being 20 ha or greater and 11% over 100 ha in size. The threshold for a mandatory Environmental Impact Assessment (EIA) was reduced from 200 to 70 ha in 1996. As a result the size of afforestation parcels decreased between 1997 and 2002, with 32% of afforestation parcels were greater than 20 ha in that period. In 2001 the EIA threshold was further reduced from 70 to 50 ha along with sub threshold EIAs in the case of afforestation likely to have a significant effect on the environment. Since 2002, 20% of afforestation parcels have been greater than 20 ha; in the last 10 years no individual forest greater than 50 ha has been established. Since 2010 all afforestation applications are screened by the Forest Service to determine whether they require an EIA; all developments over 50 ha are subject to a mandatory Environmental Impact Statement.

Table 6. Size and number of individual private grant-aided afforestation 1980-2013.

Year	Number of parcels		Mean forest size (ha)	
	Annual	Cumulative	Annual	Cumulative
1980	53	53	3.4	3.4
1981	46	99	7.0	5.1
1982	70	169	4.2	4.7
1983	82	251	4.3	4.6
1984	108	359	3.2	4.2
1985	156	515	6.7	4.9
1986	269	784	7.8	5.9
1987	386	1,170	7.5	6.4
1988	484	1,654	9.3	7.3
1989	720	2,374	11.7	8.6
1990	718	3,092	11.6	9.3
1991	779	3,871	9.3	9.3
1992	621	4,492	9.4	9.3
1993	1,036	5,528	8.0	9.1
1994	1,341	6,869	10.2	9.3
1995	1,463	8,332	11.2	9.6
1996	1,472	9,804	9.4	9.6
1997	1,276	11,080	9.2	9.6
1998	1,133	12,213	9.8	9.6
1999	1,140	13,353	10.4	9.7
2000	1,288	14,641	10.8	9.8
2001	1,370	16,011	10.5	9.8
2002	1,266	17,277	9.9	9.8
2003	1,131	18,408	8.7	9.8
2004	950	19,358	9.1	9.7
2005	1,340	20,698	8.4	9.6
2006	1,127	21,825	8.0	9.6
2007	836	22,661	7.2	9.5
2008	683	23,344	8.1	9.4
2009	729	24,073	8.8	9.4
2010	943	25,016	8.1	9.4
2011	882	25,898	7.4	9.3
2012	890	26,788	6.5	9.2
2013	950	27,738	6.6	9.1

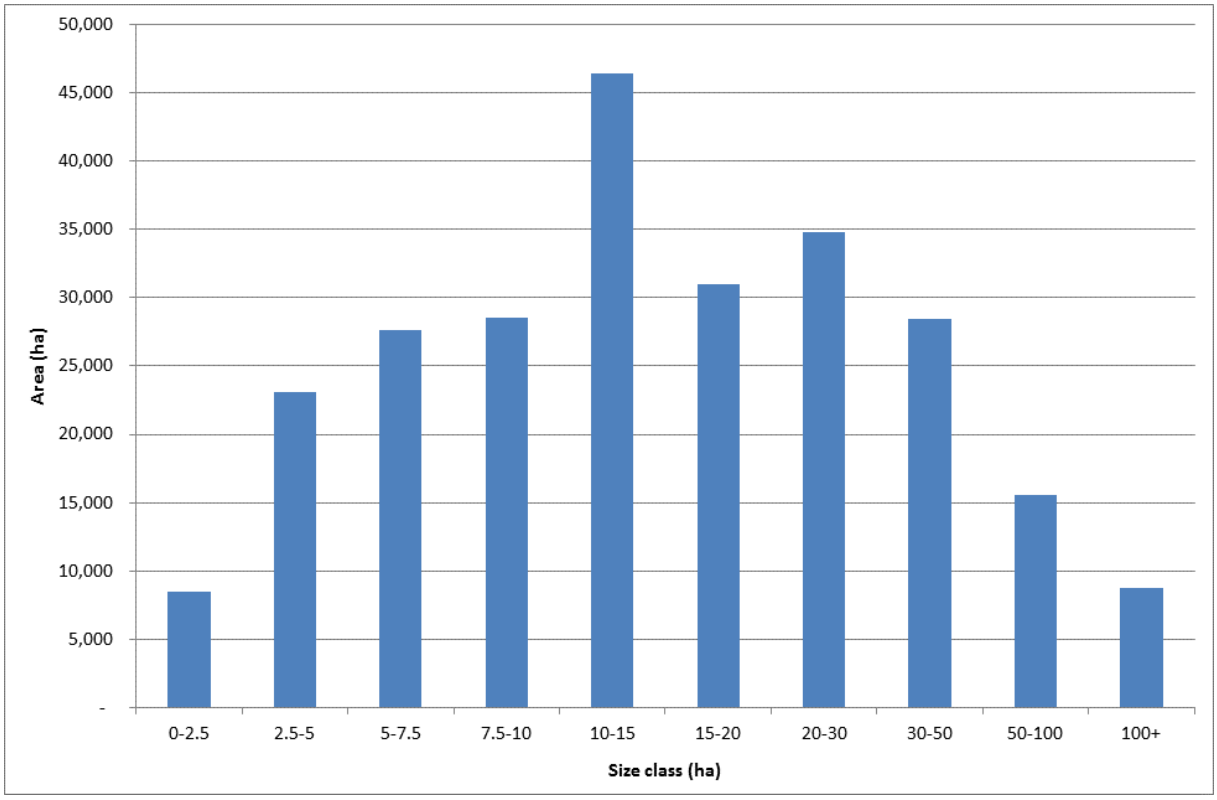

Figure 10. Size class distribution of private grant-aided afforestation 1980-2013.

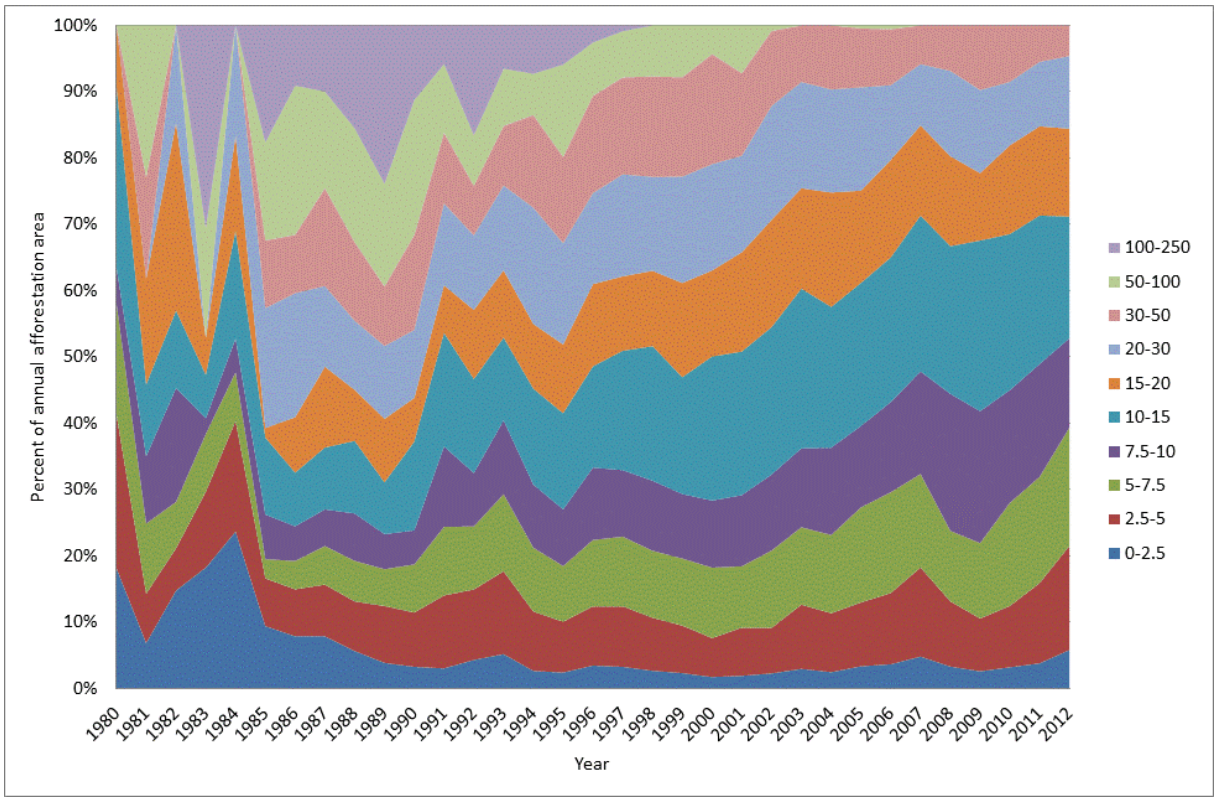

Figure 11. Proportion of annual afforested area by size class of l private grant aided afforestation from 1980-2013.

3.4 Private afforestation ownership

This section provides information on the nature of private forest owners who afforested between 1980 and 2013[16].

3.4.1 Farmer/non-farmer

Farmers accounted for 83% of private lands afforested between 1980 and 2013. Farmers and non-farmers were planting, on average, equal amounts of forest throughout the 80s and up to the early 90s. A feature of the period was the higher average forest parcel size planted by non-farmer investors (15 ha), compared to an average of 5 ha for farmers (Figure 12). From 1993 up to the present day farmer planting has dominated afforestation (Figure 13).

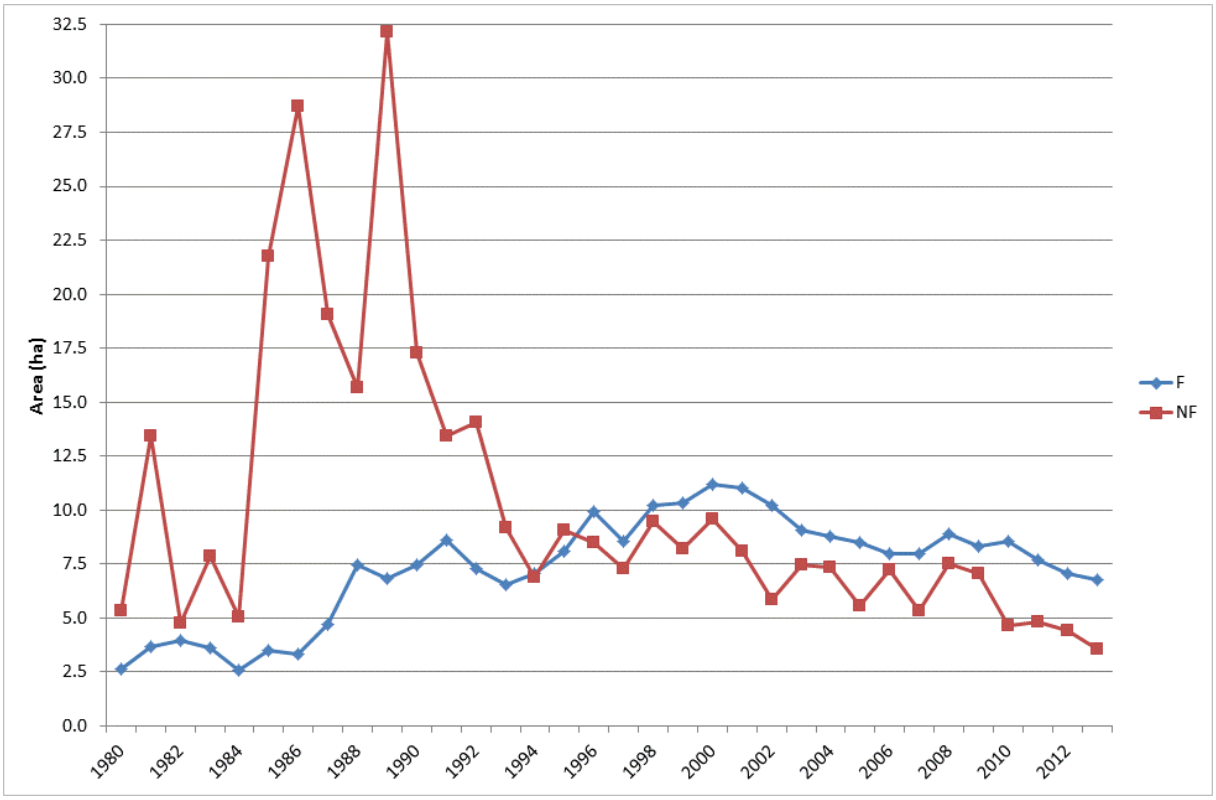

Figure 12. Average forest area of Farmer/Non-Farmer private grant-aided afforestation 1980-2013.

[16] The year data refers to when the forest was planted.

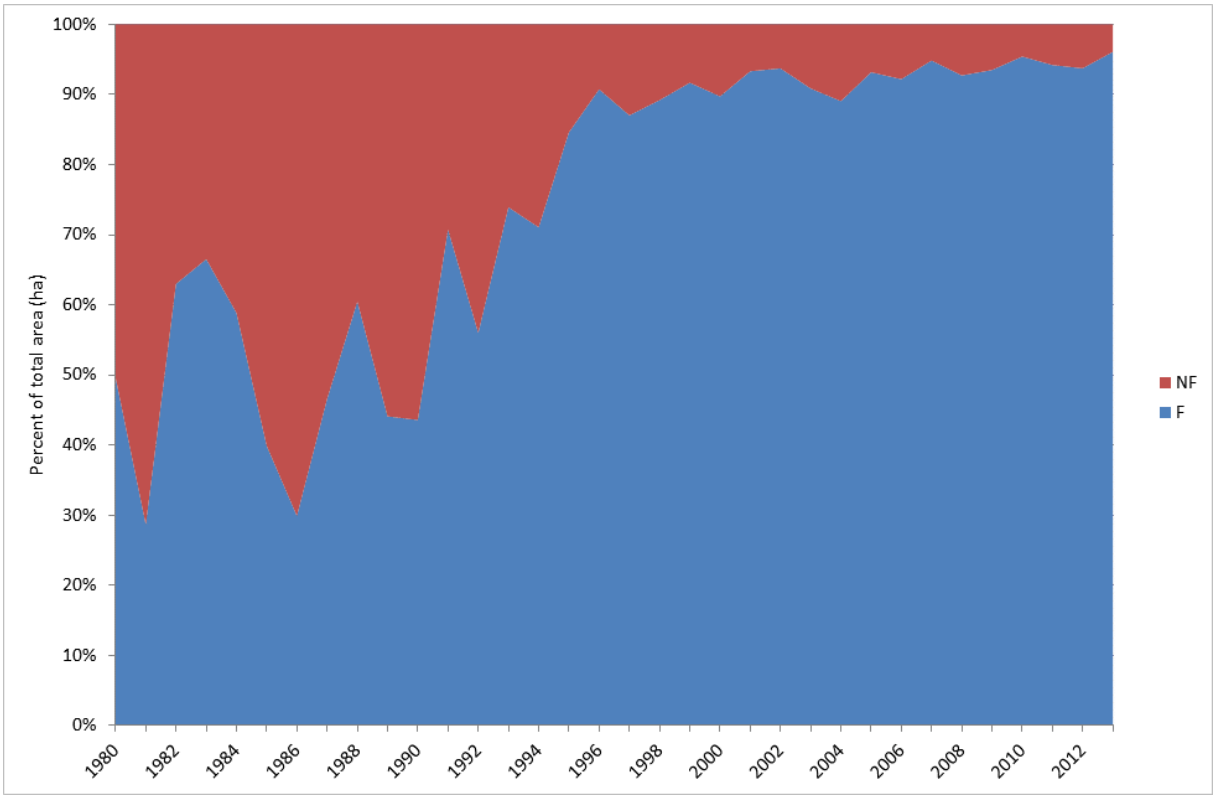

Figure 13. Farmer and Non-Farmer participation in afforestation from 1980- 2013.

3.4.2 Number of grant aided forests planted by unique owners in 2013

It has been common for forest owners to afforest more than one forest. Table 7 details the number of individual forest owners who have had one or more grant aided forest planted since 1980. Some 79.4% of owners have planted one forest, accounting for 137,370 ha. In terms of overall area, nearly half of the individual owners have had two or more grant aided forests planted. Also, it is worth noting that 2.8% of forest owners account for 19% of the total area afforested from 1980 to 2013.

While these forests may not be all contiguous, the information presented shows that the private grant-aided forest estate is less fragmented than considered heretofore. It also shows potentially more consolidated forest holdings among individual owners than was heretofore assumed.

Table 7. Number of private grant aided forests planted by unique owner and associated area (1980-2013).

No. of forests	No. of unique owners	Area ha	Owner %	Area %
1	15,751	137,370	79.4	54.4
2	2,774	46,643	14.0	18.5
3	758	20,178	3.8	8.0
4	244	9,200	1.2	3.6
5	110	6,249	0.6	2.5
6-7	91	6,793	0.5	2.7
8-9	37	3,366	0.2	1.3
10-19	41	7,817	0.2	3.1
20-49	20	7,993	0.1	3.2
50+	4	7,053	0.0	2.8
Total	19,830	252,661	100.0	100.0

3.4.3 Annual grant applications by unique owner

As stated, when assessing the average size of the total forest holdings of individual owners a profile of a less fragmented private forest estate emerges when compared to using a simple average of individual afforestation areas. By 2013, the average cumulative area afforested by unique owners was 12.7 ha by 2013 (Table 8), compared to the average individual afforestation areas of 9.1 ha (Table 6). Looking only at the average size of individual afforestation areas ignores the fact that some owners have afforested multiple forest holdings over time (Figure 15).

Table 8. Number of grant applications per owner and associated afforested areas 1980-2013.

Year	No. of unique owners		Mean forest size (ha)	
	Annual	Cumulative	Annual	Cumulative
1980	46	46	3.9	3.9
1981	41	74	7.8	6.8
1982	70	133	4.2	6.0
1983	78	193	4.5	6.0
1984	104	272	3.3	5.5
1985	142	382	7.4	6.7
1986	229	573	9.1	8.1
1987	353	860	8.2	8.7
1988	464	1,239	9.7	9.7
1989	658	1,789	12.8	11.4
1990	646	2,331	12.9	12.3
1991	764	3,058	9.5	11.8
1992	595	3,582	9.8	11.7
1993	938	4,411	8.9	11.4
1994	1,249	5,504	11.0	11.6
1995	1,352	6,623	12.1	12.1
1996	1,359	7,707	10.2	12.2
1997	1,164	8,596	10.1	12.3
1998	1,041	9,385	10.7	12.5
1999	1,036	10,179	11.5	12.7
2000	1,158	11,012	12.0	13.0
2001	1,247	11,957	11.6	13.2
2002	1,132	12,777	11.0	13.3
2003	1,004	13,457	9.8	13.3
2004	830	14,055	10.4	13.4
2005	1,183	14,897	9.5	13.4
2006	1,025	15,626	8.8	13.3
2007	759	16,159	7.9	13.3
2008	627	16,613	8.9	13.2
2009	693	17,140	9.2	13.2
2010	895	17,824	8.6	13.1
2011	849	18,502	7.7	13.0
2012	829	19,157	7.0	12.9
2013	884	19,830	7.1	12.7

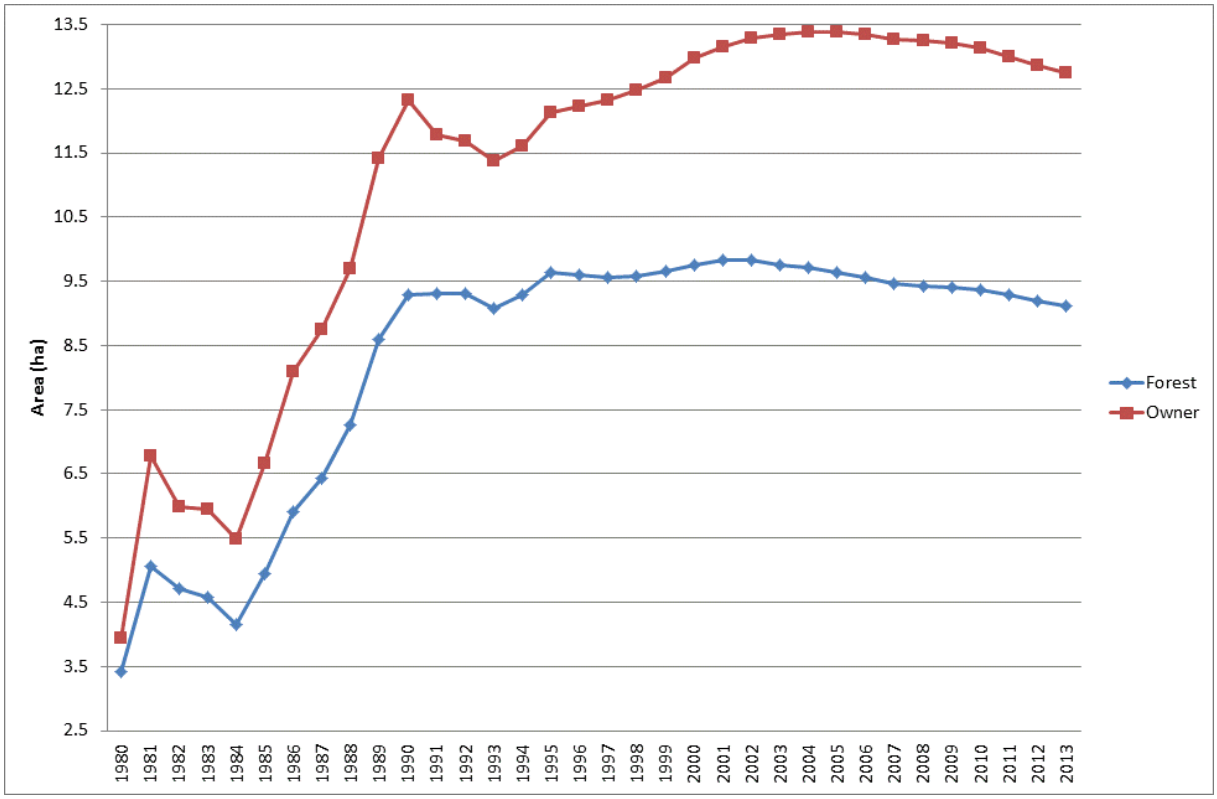

Figure 15. Average private grant-aided afforested area; individual forest area vs. cumulative forest owner area.

3.4.4 Number of individual private forest owners per county

The number of unique owners that have afforested by county is detailed in Table 9. It should be noted that individual owners recorded in any one year may have subsequently planted again in the following years.

Table 9. Cumulative number of unique owners and area by county in 1980-2013

County	No. owners	Area ha
Carlow	200	1,603
Cavan	618	6,873
Clare	1,598	20,648
Cork	2,575	28,065
Donegal	905	15,528
Dublin	75	805
Galway	1,277	14,467
Kerry	1,886	27,316
Kildare	311	3,138
Kilkenny	746	8,715
Laois	482	6,468
Leitrim	622	9,712
Limerick	967	12,615

County	No. owners	Area ha
Longford	455	4,493
Louth	69	623
Mayo	1,444	17,501
Meath	381	4,138
Monaghan	245	1,578
Offaly	601	7,882
Roscommon	922	10,657
Sligo	694	7,735
Tipperary	1,370	17,675
Waterford	629	6,947
Westmeath	449	6,304
Wexford	587	5,097
Wicklow	511	6,077

3.4.5 Age profile of forest owners in receipt of annual afforestation premium payments

In 2014 owners aged 50 years and older hold nearly 78% of afforested lands in receipt of a premium (Figure 16).

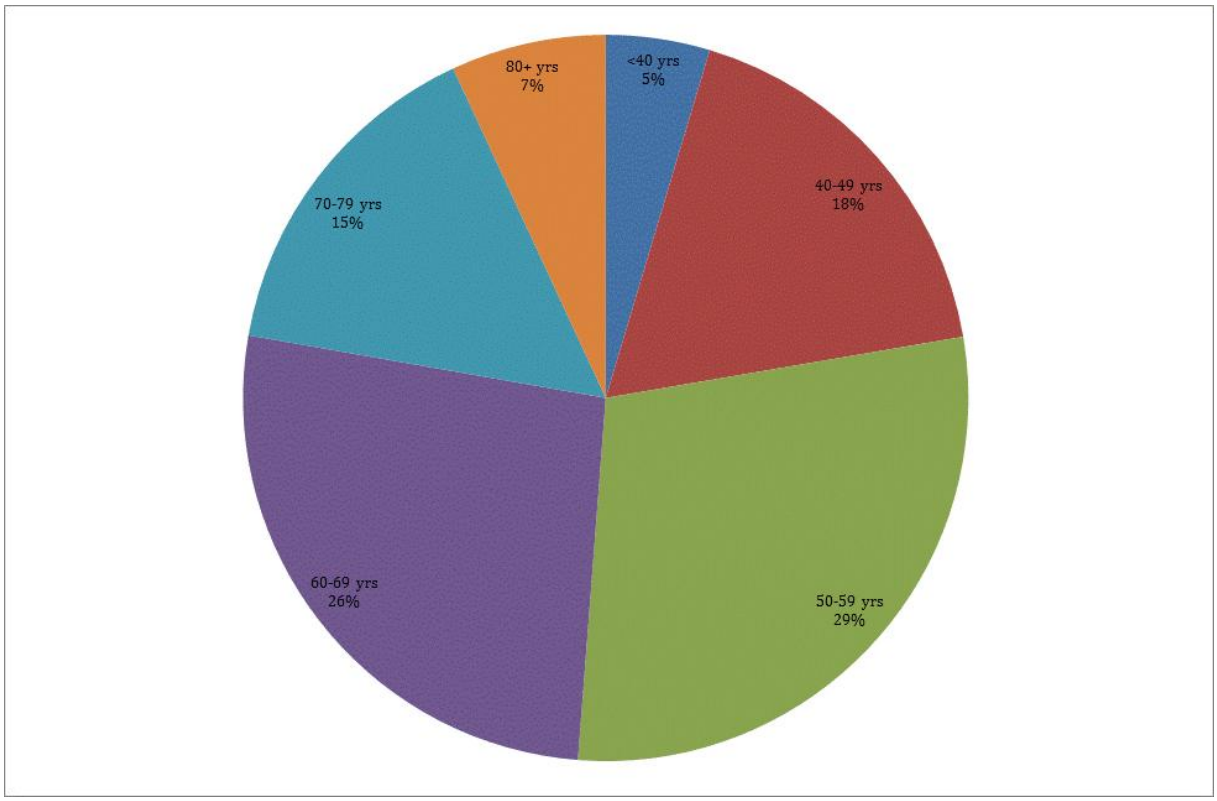

Figure 16. Age profile of forest owners in receipt of annual afforestation premium in 2014.

3.4.6 Private (other) ownership details

Previous sub-sections in this chapter have outlined ownership profiles of the private grant-aided estate. Information on ownership in the Private (other) component of the forest estate is not available, which comprised 89,350 ha in 2012 (NFI). The 1973 Inventory of Private Woodlands[17] provided inventory information for forest areas of 40 ha or more (17,481 ha) or 21% of the total of 81,958 ha of private forests estimated at the time. At the time areas 40 ha or more and under single ownership represented the more commercially viable forest stands in private ownership. The remaining Private (other) forest is comprised of primarily juvenile, short-living, naturally regenerated broadleaf species such as birch. These forest areas are commonly quite small and frequently of limited use for agriculture due to slope and other restrictions. The number of owners in this category is in the region of 20-30,000. In 1973 over 40% of the 81,958 ha was comprised of "scrub" category. The size category of the 151 estates with detailed historical inventory information is shown in Table 10.

Table 10. 1973 Inventory of Private Forest - size categories.

Estate Forest Area (ha)	Number of estates	Area (%)
40-50	25	7
51-100	67	24
101-500	56	59
501-1,000	3	11

[17] Purcell, T. 1979. Inventory of Private Woodlands, 1973, Department of Fisheries and Forestry, Forest and Wildlife Service.

3.5 Grant aided forest removal

The area of private grant aided forest taken out of afforestation between 2007 and 2013 is shown in Table 11, and account for 1-4% of the annual afforestation rate over the same years.

Table 11. Lands taken out of afforestation 2007-2013.

Year	Number	Area (ha)
2007	47	67
2008	101	209
2009	110	147
2010	74	99
2011	68	87
2012	75	91
2013	63	70

3.6 Change of applicant

A substantial area of private grant-aided forests change ownership each year (Table 12). Most ownership change is within families from one generation to the next.

Table 12. Change of ownership by area of forest 2007-2013.

Year	Number	Area (ha)
2007	345	3,385
2008	348	3,309
2009	374	3,850
2010	393	3,612
2011	335	2,970
2012	402	3,999
2013	379	3,440

4. Forest Management

4.1 Introduction

This chapter provides information on forest roads, felling activity, reforestation and forest certification as follows:

- Public forest road construction trends 1944-2013;
- Private forest road building between 2007 and 2013;
- Felling licenses issued annually by the Forest Service between 2010 and 2012;
- Clearfell levels in state forests between 1933 and 2013;
- Private sector broadleaf tending and thinning between 2009 and 2013;
- The level of annual state reforestation between 1933 and 2013;
- The forest area damaged by disease 2010-2013;
- The certified forest area.

Key findings

- Since 1944, 132 km of forest roads have been built annually in Public forests;
- Between 2007 and 2012 87 km of private grant-aided forest roads were built annually;
- Almost 6,500 ha were reforested on public lands in 2013;
- The total certified forest area in Ireland is 401,986 ha, or 55% of the forest area;
- Public forest clearfell peaked between 2001 and 2007, coinciding with a peak in domestic construction activity;
- Between 2007 and 2010 state roundwood production, mainly Coillte, accounted for 82% of the national roundwood harvest.

4.2 Forest Roads

Forest roads enhance the economic viability of forests primarily by improving access for harvesting. In addition, forest roads also provide roundwood stacking, drying and chipping areas. Apart from economic enhancement, forest roads also improve the environmental and biodiversity value of forests by increasing edge effects, improve access to deal with fire and allow for better health and safety by providing access for emergency vehicles.

4.2.1 Public forest roading

Since 1944, 9,254 km of forest roads have been built annually in the public forest estate or on average 132 km annually (Figure 17).

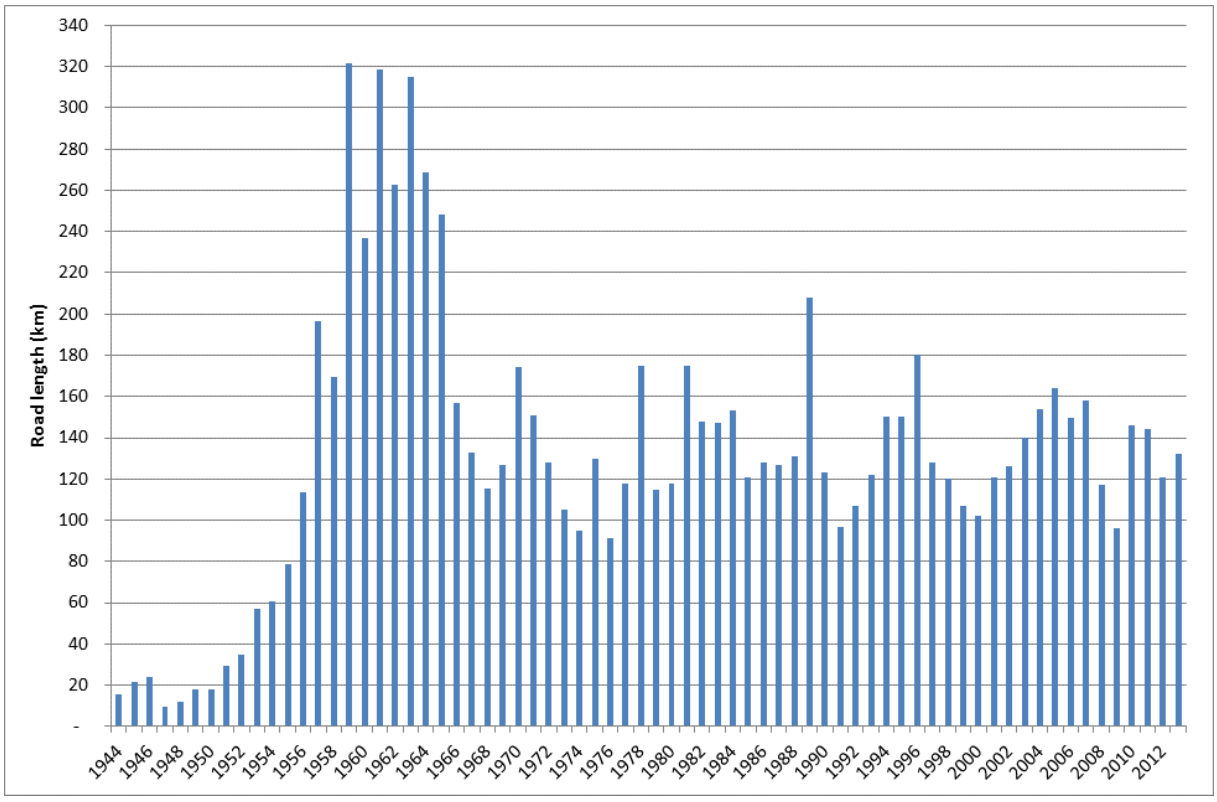

Figure 17. Forest road construction in public forests 1944–2013.

4.2.2 Private forest grant-aided roading

Up to 2007, due to the age profile of forests, forest roads were built primarily in public forests; however with the maturation of private sector forests, roads are increasingly required in private forests (Figure 18).

Since 2006, IFORIS[18] has been used to record the number and length of forest roads grant aided. As the private estate reaches harvesting stage there has been an increase in the length of forest road built. Between 2006 and 2012, on average 87 km of private grant-aided forest roads were built annually. However in more recent years there has been a decrease in the length of forest roads built. This trend needs to be reversed in order to mobilise the increased thinning volumes available from the large scale afforestation of the mid-nineties.

[18] IFORIS is an Integrated Forest Information System which was developed for the Forest Service for the processing of forestry pre-approval, grant and premium applications.

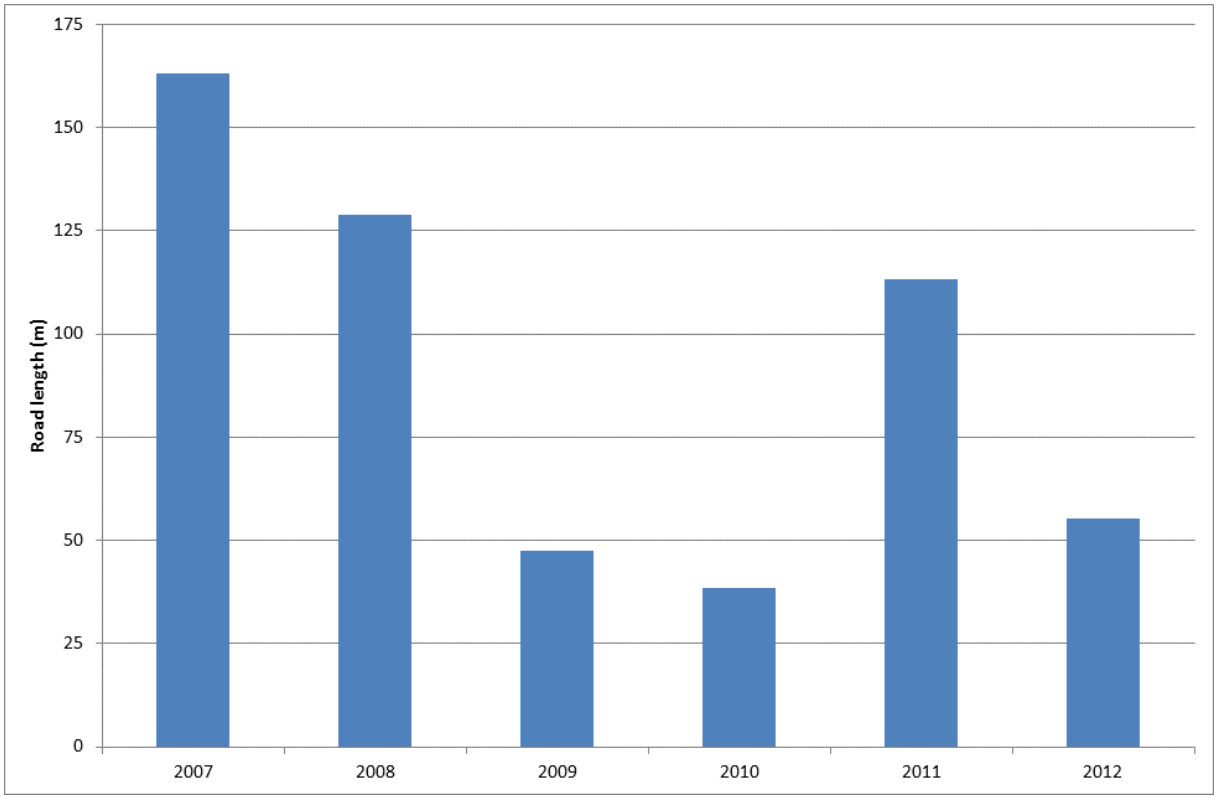

Figure 18. Private grant-aided forest road building 2007 to 2012

4.3 Private forest estate felling activity

Approval for the felling of trees in Ireland is licensed by the Forest Service. Landowners are required under the 1946 Forestry Act to give notice of intention to fell trees.

Table 13 shows the area of lands granted felling licences for both thinning and clearfelling in privately-owned forests between 2010 and 2013. In 2013 15,150 ha were licensed for thinning, an increase of 16% over the 2012 area and an increase of 46% compared with 2010.

Table 13. Area of felling licences issued for private forests, 2010-2013.

Year	Thinning area (ha)	Clearfell area (ha)
2010	10,382	439
2011	12,275	590
2012	13,037	467
2013	15,150	395

4.4 *Public forest thinning and clearfelling*

The area of public forest clearfelled peaked in 2003, coinciding with a peak in domestic construction activity (Figure 19). Thinning activity in the public estate is shown in Figure 20.

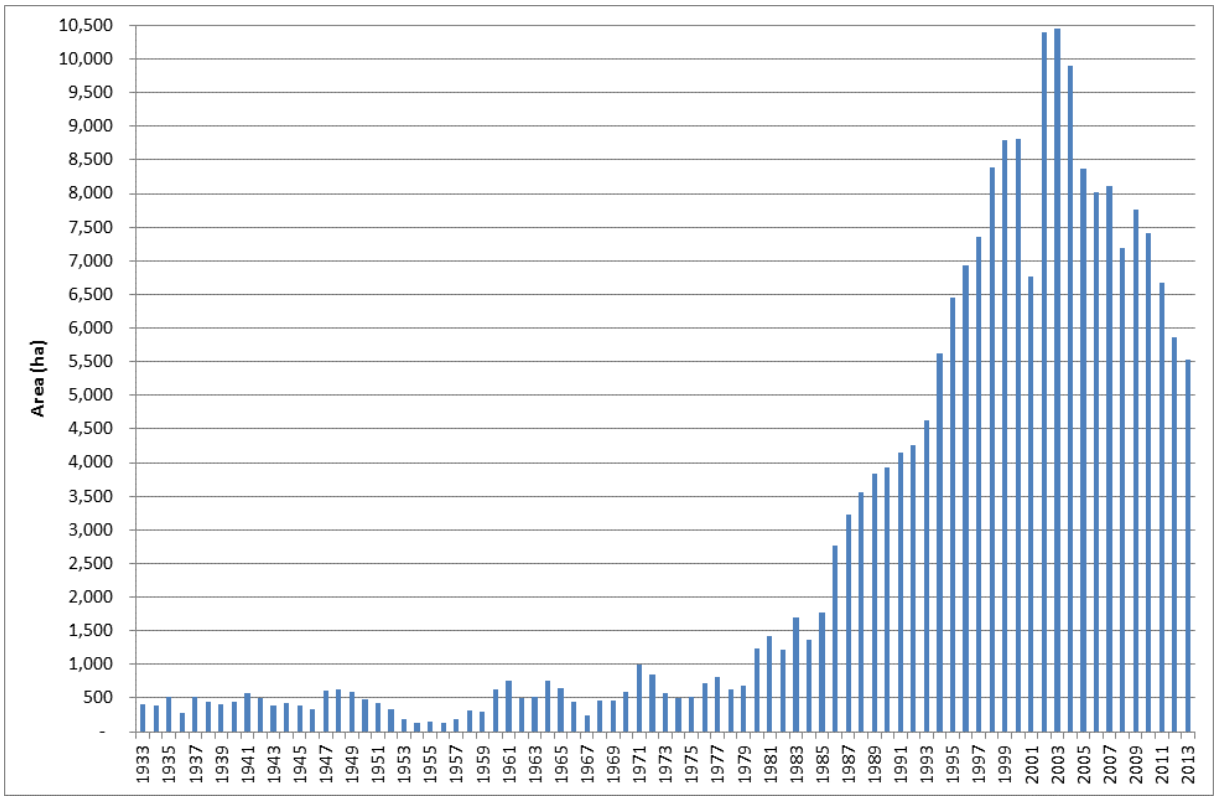

Figure 19. State forest clearfelling) 1933-2013[19]

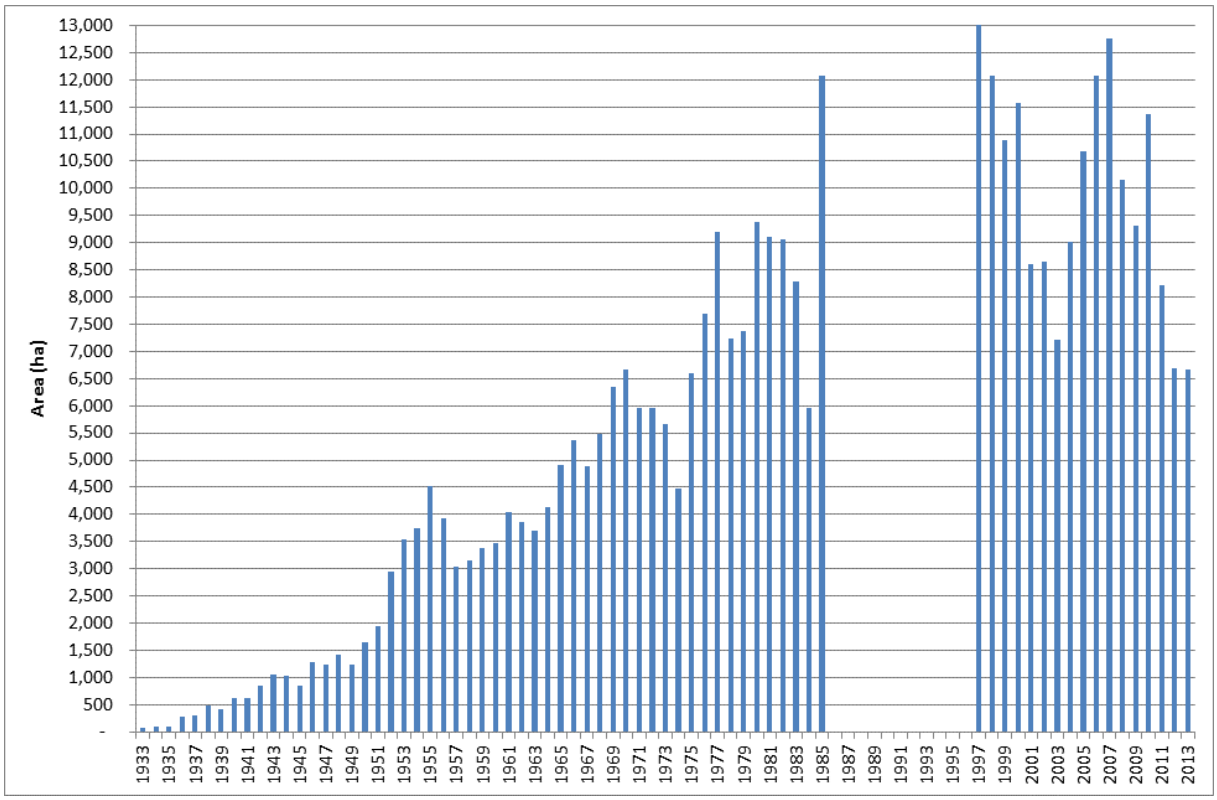

Figure 20. State forest thinning 1933-2013[20]

[19] Clearfell areas from 1986-2000 were estimated by averaging the reforestation areas for the two years following clearfell.

4.5 Public forest reforestation

Reforestation is the regeneration of existing areas of forests that have been felled. It is a condition of most felling licences that the felled forest is reforested, annual reforestation rates are mainly driven by harvesting levels (with a time lag, usually of around 2 years, between harvesting and reforestation).

Public forest reforestation rates from 1933 to 2013 are shown in Figure 21. Up until the early 80s, reforestation rates were low due to relatively low afforestation up to 1950. In the 50s and 60s afforestation greatly expanded, which is in turn was reflected in the increasing reforestation of the 80s and 90s. The area of public reforestation has fallen by about a third, since a peak of 10,000 ha in 2003. The years 2008 and 2009 show a significant decrease in reforestation as a result of a sharp decrease in harvesting for the same period, as a result of a downturn in the domestic construction sector.

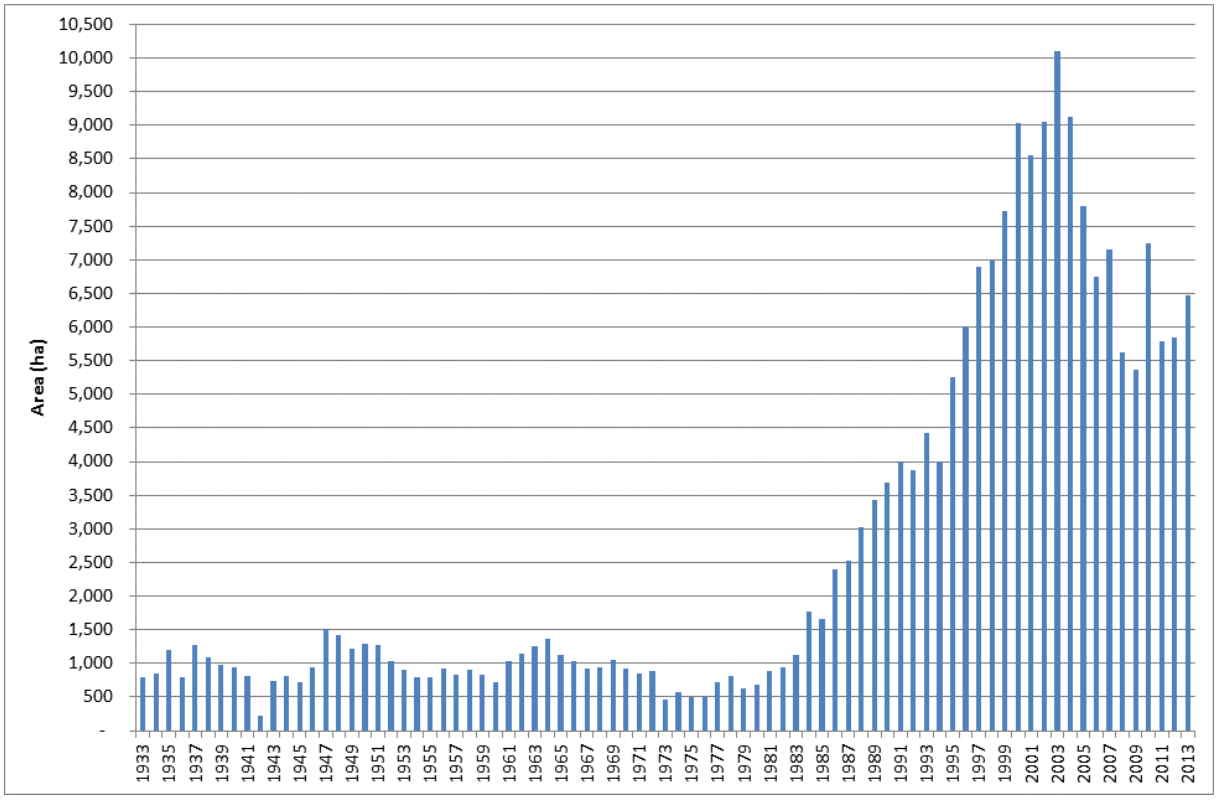

Figure 21. Public sector reforestation 1933 to 2013.

[20] Thinning data for 1986-1996 are currently not available.

4.6 Private Broadleaf Thinning and Tending

As part of the Forest Improvement Scheme (FIS) grants have been available for the tending and thinning of broadleaves. The objectives of the scheme are:

- Improvement felling of malformed or over-mature trees;
- Felling of additional trees to release potential final crop trees;
- Pruning to improve stem quality;
- Thinning or re-spacing to promote growth;
- Management and re-spacing of natural regeneration.

Grant aid for the treated area is available for either tending or thinning operations, depending on which are the most appropriate to the site (i.e. it is not necessary to carry out both sets of operations for grant aid). The tending and thinning element of the FIS was introduced in 2009. In total 4,015 ha has been tended or thinned up to the end of 2013 (Table 14).

Table 14. Areas tended and thinned between 2009 and 2013 under the Forest Improvement Scheme

Year	2009	2010	2011	2012	2013
Area (ha)	312	657	1,168	958	920

Ash has been the main species grant aided. Table 15 shows the species areas grant aided.

Table 15. Broadleaves tended/thinned under the Forest Improvement Scheme since, 2009-2015.

Species	Ash	Alder	Sycamore	Beech	Other Broadleaves	Conifers[21]	Total
Area (ha)	2,610	106	866	106	165	162	4,015

4.7 Certification

Voluntary forest certification schemes are run by international non-governmental organisations to promote good forest practice. In Ireland, there are currently two certifying bodies: the Programme for the Endorsement of Forest Certification (PEFC) and the Forest Stewardship Council (FSC). Voluntary forest certification links the demand for forest products to environmental and social standards to producers who to show that wood or wood products come from certified forests. All major Irish sawmills are certified.

The Forest Stewardship Council has certified the management of the Coillte estate which comprises 54% of the national forest estate. Certification has mainly been an issue for public forests up to now. However as the private sector harvest increases, certification is likely to be an issue for private forest owners in the near future. Currently about 6,500 ha of private forest is certified.

[21] Refers to the removal of conifer species planted in intimate mixtures with broadleaves.

5. Forest Production and Carbon

5.1 Introduction

This chapter provides information on:

- The annual roundwood harvest between 1955 and 2013;
- The roundwood available for processing, 2006-2013;
- The roundwood forecast 2014-2028;
- Roundwood timber prices for both Coillte and the Private sector;
- Timber and paper products trade;
- Firewood production;
- Forest based biomass usage;
- The role of forests in climate change mitigation;
- Ireland's Kyoto obligation and its fulfilment;
- Irish forest carbon stocks.

Key statistics

- The total roundwood harvest in 2013 (Including firewood) was 3.04 million cubic metres;
- Eighty seven per cent of the roundwood available for processing came from Coillte in 2013, with the balance mainly coming from the private sector;
- The total forecast of net realisable volume production for the island of Ireland over the forecast period, 2014-2028, is estimated as being 65.7 million m^3 overbark with an additional 1.9 million m^3 potentially available in the tip - 7cm category;
- The average Coillte timber price in 2013 was nominally up 7% over 2012 and continued a largely upwards trend overall in timber prices since 2009;
- In value terms Ireland was exporting 50% more sawn timber in 2013 than in 2008, mainly to the UK;
- In 2013, 34% of the roundwood harvested in the Republic of Ireland was used for energy generation, mainly within the forest products sector;
- In 2013, 67% of the Irish market for sawn softwood timber was supplied by domestic production with the balance being imported;
- The usage of Irish roundwood for wood energy accounted for over one third of the harvest in 2013 and mitigated over half a million tonnes of CO_2 emissions;
- The national forest estate is an important carbon reservoir, amounting to 381 million tonnes of carbon in 2012; an increase from 348 million tonnes in 2006;
- Article 3.3 forests represented a net removal of 16 Mt of CO_2 eq. from the atmosphere between 2008 and 2012, offsetting ca. 5% of all national emissions.

5.2 Roundwood

5.2.1 Roundwood Harvest 1955-2013

The national roundwood harvest (excluding firewood & hardwood) from Irish forests between 1955 and 2013 is shown in Figure 22. No data are available for the private roundwood harvest prior to 2006, however it was estimated that 100,000 m^3 was harvested from the private forest estate in 2000[22].

Up until the early eighties roundwood harvest was low, due to relatively low afforestation rates up to 1950. The early 80s saw the opening of the Finsa and Medite board mills which drove up demand for roundwood and sawmilling residues.

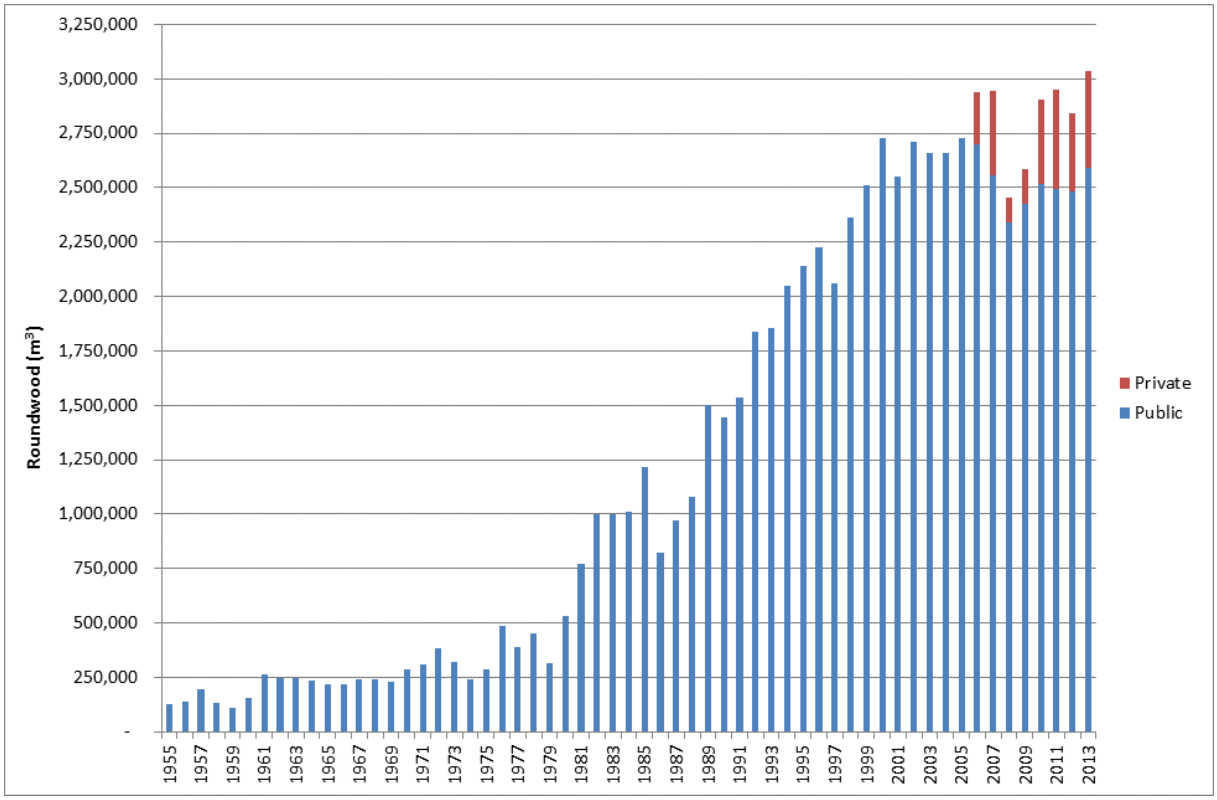

Figure 22. Roundwood harvest 1955-2013.

[22] Gallagher, G. and O'Carroll, J.2001 *Forecast of Roundwood Production from the Forests of Ireland 2001-2015.* COFORD, Dublin.

5.2.2 Roundwood available for processing 2006-2013

The annual national roundwood available for wood processing, excluding firewood and hardwood, is shown in Table 16. The sharp downturn in roundwood available for processing in 2008 and 2009 reflected the downturn in the domestic construction sector. At this time domestic sawmills were also seeking to increase their share in export markets. In 2013, 2.85 million cubic metres of roundwood were available for processing in the Republic of Ireland, a 9% increase on 2012 production (Table 16). Between 2006 and 2013 roundwood production from privately owned forests averaged just over 299,750 m^3. In 2013, 328,000m^3 of roundwood came from privately owned forests.

Table 16. Roundwood available for processing in the Republic of Ireland 2006-2013.

Year	Log imports less exports	Coillte Output	Private output	Total Roundwood	Sawlog	Pulp	Stake
2006	214,000	2,700,000	240,000	3,154,000	2,176,000	820,000	158,000
2007	57,000	2,556,000	390,000	3,003,000	1,934,000	889,000	180,000
2008	104,000	2,050,000	118,000	2,272,000	1,455,000	761,000	56,000
2009	-63,000	2,354,000	130,000	2,421,000	1,602,000	731,000	88,000
2010	28,000	2,217,000	463,000	2,708,000	1,603,000	987,000	118,000
2011	55,000	2,299,000	386,000	2,740,000	1,580,000	1,044,000	116,000
2012	-18,000	2,269,000	343,000	2,594,000	1,622,000	841,000	131,000
2013	49,000	2,474,000	328,000	2,851,000	1,710,000	1,024,000	117,000

In recent years the private sector has begun to make a substantial contribution to the annual harvest. This reflects the greater area of private forests reaching first thinning stage, much of which was planted in the early 1990s, and increased export market share gained by sawmills.

In 2013, 34% of the roundwood harvested in the Republic of Ireland was used for energy generation, mainly within the forest products sector. In terms of self-sufficiency, 67% of the Irish market for sawn softwood timber was supplied by domestic production with the balance being imported. Over the same period, only 4% of the Irish market for sawn hardwood was supplied domestically. [23]

[23] Woodflow and forest-based biomass energy use on the island of Ireland (2013).COFORD Connects No.34. COFORD, Dublin.

5.2.3 Roundwood Forecast

The total forecast of net realisable volume production for the island of Ireland over the forecast period, 2014-2028, is estimated as being 65.7 million m^3 overbark with an additional 1.9 million m^3 potentially available in the tip - 7cm category.

Table 17 displays the future sustainable harvest levels between 2014 and 2028 by assortment and ownership type. The potential harvest will increase from 3.4 million m^3 to 6.7 million m^3 over this period (Table 17). Privately owned forests will steadily increase their share of the total harvest of roundwood from 12.7% in 2014 to 50.3% in 2028.[24]

Table 17. Forecast of potential conifer net realisable volume production by assortment category and ownership type 2014 -2028, (000 m^3 overbark).

Year	Private					Coillte					Overall Total
	Tip - 7cm	7-13cm	14-19cm	20+cm	Total	Tip - 7cm	7 - 13cm	14-19cm	20+ cm	Total	
2014	41	229	150	45	466	58	543	871	1,492	2,964	3,429
2015	47	264	183	57	551	57	598	844	1,402	2,900	3,452
2016	52	297	196	72	617	55	583	859	1,293	2,789	3,406
2017	64	377	284	91	816	54	580	826	1,316	2,777	3,593
2018	56	317	191	122	686	55	592	828	1,346	2,822	3,508
2019	65	366	290	195	917	56	584	864	1,362	2,866	3,783
2020	78	492	486	262	1,319	57	616	865	1,362	2,899	4,217
2021	85	485	555	463	1,589	57	585	833	1,411	2,886	4,475
2022	84	483	528	404	1,500	57	546	816	1,502	2,921	4,421
2023	93	502	784	848	2,228	58	516	817	1,551	2,941	5,169
2024	84	490	657	617	1,848	58	507	800	1,595	2,960	4,808
2025	72	427	634	703	1,836	57	478	789	1,598	2,922	4,758
2026	76	441	715	886	2,118	54	444	756	1,985	3,238	5,356
2027	101	544	1,209	1,605	3,458	54	444	756	1,985	3,238	6,696
2028	96	519	1,090	1,620	3,325	54	444	756	1,985	3,238	6,563
Total	1,095	6,234	7,953	7,991	23,273	841	8,059	12,277	23,184	44,361	67,634

[24] Philips, P. 2011.*All Ireland Roundwood Production Forecast 2011-2028.* COFORD, Dublin.

5.2.4 Roundwood Prices- Coillte

Coillte is the dominant supplier of logs to the processing sector in Ireland. The standing timber price is the price paid per cubic metre of timber by the purchaser, where the purchaser is responsible for harvesting. The figures quoted in table 18 below are for sales to the sawmill sector only and include all species and harvest types. Since the mix of species and harvest types can vary from quarter to quarter, this impacts on contracted prices in addition to the impact of other market factors. The majority of prices quoted are for standing sales with retained pulpwood, i.e. there is no value for pulp included in these prices. Coillte retain the pulpwood to supply their boardmills i.e. Smartply and Medite. The average timber price in 2013 was nominally up 7% over 2012 and continued a largely upwards trend overall in Coillte timber prices since 2009.

Table 18. Average Standing Timber Prices (€) by category, Coillte 2004 – 2013.

Category (m^3)	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
0.001 - 0.074	-	8.91	4.11	10.04	-	-	-	-	10.5	-
0.075 - 0.124	5.5	7.8	6.67	9.37	-	3.96	-	-	-	-
0.125 - 0.174	11.91	9.45	12.22	8.64	19.38	4	-	8.5	9.5	-
0.175 - 0.224	14.58	12.4	17.15	19.43	24.14	15.04	38.64	32.75	-	-
0.225 - 0.274	20.78	17.28	18.07	34.41	21.43	19.01	47.59	39.53	40.92	48.73
0.275 - 0.324	24.89	22.27	26.44	37.98	28.86	19.9	43.8	42.26	43.17	47.09
0.325 - 0.374	23.98	22.64	22.11	43.43	30.37	23.2	44.06	43.73	44.46	51.32
0.375 - 0.424	25.12	24.56	24.58	41.24	33.78	24.48	58.17	44.37	46.84	48.64
0.425 - 0.474	28.69	26.17	34.42	43.72	31.45	24.03	55.54	47.16	45.57	51.99
0.475 - 0.499	36.05	25.89	34.31	47.91	35.69	25.12	55.07	45.95	48.47	54.54
0.500 - 0.599	32.52	31.71	32.52	50.46	37.76	26.82	59.91	48.25	50.46	51.59
0.600 - 0.699	36.92	35.1	36.3	52	38.41	27.07	63.67	48.99	52.9	55.39
0.700 - 0.799	38.59	37.89	39.42	52.09	39.04	26.97	58.75	49.92	54.12	55.60
0.800 - 0.899	41.23	38.71	41.19	50.64	42.06	27.34	57.11	50.65	52.79	57.41
0.900 - 0.999	40.45	40.48	37.88	53.59	41.44	28.86	56	51.25	53.95	60.68
1.000 +	43.7	38.53	45.11	55.62	39.59	29.35	59.55	51.31	53.77	54.00
Average (€/m3)	**32.25**	**30**	**30.94**	**47.21**	**35.29**	**25.74**	**56.67**	**47.84**	**49.97**	**53.56**

Source: Coillte Sales and Marketing as presented by Teagasc[25]

[25] http://www.teagasc.ie/forestry/advice/timber_prices.asp#Timber_prices_supplied_by_Coillte

5.2.5 Roundwood Prices- Private Sector

The number of timber sales and the size of timber sales lots from private sales are relatively small compared to Coillte and as a result, Coillte's price information is more robust than any information on sales in the private sector[26]. Prices presented in Table 19 below are therefore for guidance purposes only. The UCD Forestry Section and the Irish Timber Growers Association (ITGA) collate timber price information from private sources. Private timber prices follow a nominal upwards trend in prices since 2005, although this trend estimation is less reliable due to the small sample size. The prices presented in Table 19 include pulpwood prices from the private sector.

Table 19. Roundwood prices received by Private Growers by average tree size category 2005 – 2012. (* denotes small number of sales)

Category (m^3)	2005	2006	2007	2009	2010	2011	2012	2013
0.001 - 0.074	5.98	3.98	6.00	8.28	10.50	10.60	10.20	9.44
0.075 - 0.124	6.80	6.54	10.51	7.15	14.40	14.30	14.30	12.80
0.125 - 0.174	10.12	10.31	12.76	7.26	17.40	13.50	19.20	18.96
0.175 - 0.224	14.83	16.06	17.80	11.59	22.90	15.80	17.80	20.44
0.225 - 0.274	14.96	15.16	37.82	11.29	35.30	23.10	25.10	18.62
0.275 - 0.324	21.77	24.82	27.47	11.64	47.10	36.90	32.90	21.84
0.325 - 0.374	26.49	21.54	49.65	14.50	64.10	57.50	38.60	47.42*
0.375 - 0.424	24.26	23.73	33.06	16.00	56.70	52.30	28.40	44.48
0.425 - 0.474	25.33	43.17	43.80	50.00	54.20	53.30	48.30	32.00*
0.475 - 0.499	-	-	52.00	-	53.00	35.00	-	
0.500 - 0.599	37.77	38.43	53.09	-	57.10	50.30	49.20	45.05
0.600 - 0.699	35.80	43.37	41.68	-	54.30	51.70	51.80	45.99
0.700 - 0.799	44.51	44.80	52.57	-	54.30	52.60	54.70	53.79
0.800 - 0.899	46.93	45.06	57.20	-	53.70	50.40	54.90	53.35
0.900 - 0.999	46.82	45.00	50.51	-	52.90	53.40	54.80	51.26
1.000 and over	44.47	45.27	56.32	-	56.90	45.00	54.20	52.97

Source: UCD Forestry Section and the Irish Timber Growers. Presented in Forestry & Timber Yearbook 2014.

[26] *Forestry Economic Review 2012/2013*. Teagasc, 2013.

5.2.6 Forest-based biomass

Forests also provide a source of renewable raw materials for fuel and wood products which help mitigate rises in greenhouse gases. Usage of wood fuels is increasing due to renewable energy polices and as young plantations enter the production stage.

In 2013, 33.5% of roundwood harvested was used for energy generation, mainly within the forest products sector (Table 20). The usage of roundwood for wood energy mitigated an estimated half a million tonnes of CO_2 emissions. Since 2006, the use of wood biomass energy has resulted in an estimated greenhouse gas (GHG) emission saving of 3.12 million tonnes of CO_2.[27]

Table 20. Use of forest-based biomass and as a proportion of total roundwood harvest (2010-2013).

	2010	**2011**	**2012**	**2013**
	000 m³ OB RWE			
Wood-biomass use by the energy[28] and forest products industry	554	572	611	660
Roundwood chipped for primary energy use	39	41	30	100
Domestic firewood use	199	214	225	230
Short rotation coppice	1	5	5	5
Wood pellets and briquettes	121	129	144	161
Charcoal	2	5	2	1
Total	916	966	1,017	1,157
Roundwood harvest				
Roundwood available for processing	2,708	2,740	2,594	2,852
Firewood harvest	199	214	225	230
Total	2,907	2,954	2,819	3,082
Forest-based biomass as a % of total roundwood harvest	31.5	32.6	36.0	33.5

[27] *Woodflow and forest-based biomass energy use on the island of Ireland* (2013).COFORD Connects No. 34. COFORD, Dublin.

[28] This includes co-firing of wood-biomass at Edenderry Power; www.edenderrypower.ie

5.2.7 Firewood production

Statistics on the sale of firewood from public forests between 1937 and 1987 are shown in Figure 23. Firewood consumption peaked during the Second World War due to restricted coal imports. There was also increasing firewood demand during the eighties, reflected in increased sales in this decade. Official estimates of firewood use are unavailable between the years 1988 and 2005.

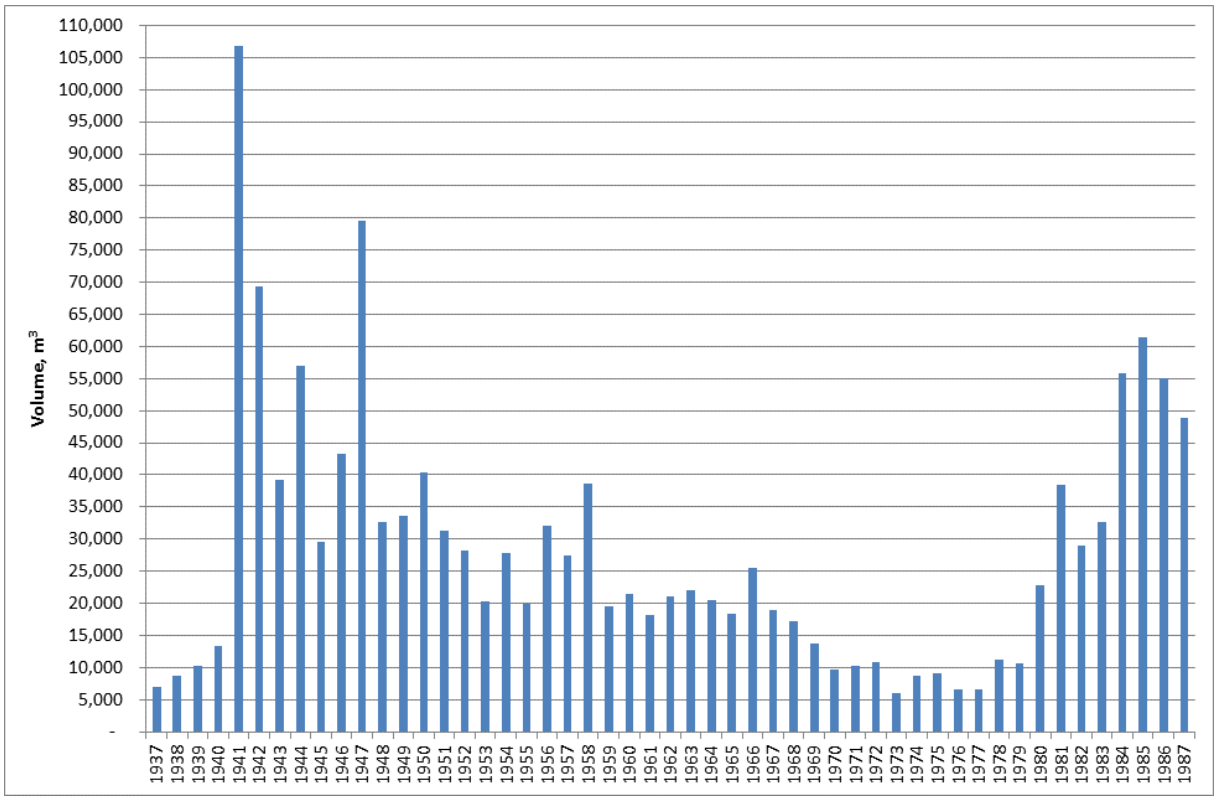

Figure 23. Firewood production volume from public forests 1937-1987.

Residential energy use grew by 26% (1.1% per annum) over the period 1990– 2011. Corrected for climate the growth was 19%. During this time the number of households in the State increased by 64%, from approximately 1.0 million to 1.65 million. Since 1990, there has also been a decrease in the use of firewood in open fires, in line with the general decline of solid-fuel open fires, with a concurrent rise in the use of oil, gas and electricity for residential energy consumption. As a result the share of firewood used for domestic heating has decreased since 1990[29]. However with the significant increase in the number of households and energy usage per household there has been a concurrent significant increase in firewood sales since the eighties. In recent years there has also been a large increase in the number of stoves used domestically, with a 35% increase in stove sales noted for 2011 from 2010[30].

Firewood use in Ireland between 2006 and 2013 from state and private forests, including wood sourced from, non-forest areas, is shown in Figure 24. The firewood market in Ireland has grown by 56% from 147,000m^3 in 2006 to 230,000m^3 in 2013. First-thinning of broadleaf forests also qualify for grant aid since 2009. This measure has resulted in substantial mobilisation of firewood from first thinnings, principally for domestic use. In addition, firewood is also harvested by forest owners for their own use and firewood[31]. In 2013, 51% of firewood came from private lands while 49% came from state forests. Firewood accounted for nearly 27% of the national private roundwood harvest and just over 4% of the Coillte roundwood harvest. Ireland is now consuming more firewood than at any other time in the state's history.

[29] *Energy in Ireland 1990 – 2011*. Sustainable Energy Authority of Ireland Report 2012
[30] *Situation and Outlook for Forestry 2011/2012*. Teagasc 2012
[31] *Woodflow and forest-based biomass energy use on the island of Ireland (2012).* Coford

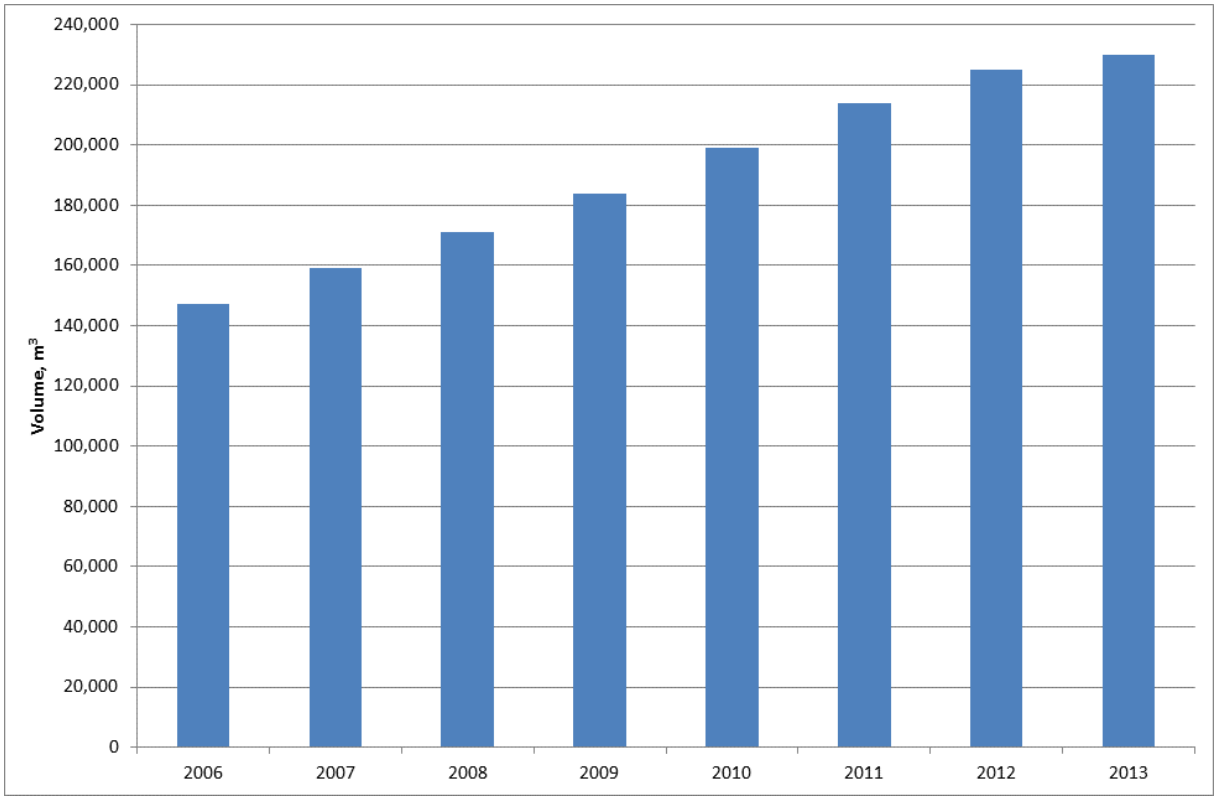

Figure 24. The domestic firewood market 2006-2013.

5.3 Timber and paper products trade

In 2013, exports of forest products from the Republic of Ireland were valued at €339 million, a 12% increase on 2012. Wood-based panels accounted for nearly 60% of the value of forest products exports, the balance compromising paper and sawn timber exports (Table 21).

In value terms Ireland became a net exporter of sawn timber in 2010, the first time since 1961, when forest products statistics began to be compiled by the FAO. This came about due to the closing of the gap between the value of exports and imports from 2008 onwards due to the collapse of the domestic construction market and greatly increased exports of sawn timber. In value terms Ireland was exporting 50% more sawn timber in 2013 than in 2008, mainly to the UK. In 2013, 67% of the Irish market for sawn softwood timber was supplied by domestic production with the balance being imported. Over the same period, only 4% of the Irish market for sawn hardwood was supplied domestically.

Table 21. Timber and paper products trade, volume and value (2008-2013)[32]

	Imports											
	2008	2009	2010	2011	2012	2013	2008	2009	2010	2011	2012	2013
	000 m³						€ million					
Sawn Timber	412	232	242	201	145	134	141	66	74	64	54	51
Wood-based panels	264	181	166	195	204	194	108	68	65	68	75	78
000 tonnes												
Pulp products	29	32	41	54	47	50	20	22	31	45	45	41
Paper & particle-board products	526	379	370	383	415	428	520	308	313	333	339	340
TOTAL							789	464	483	510	513	510
	Exports											
	2008	2009	2010	2011	2012	2013	2008	2009	2010	2011	2012	2013
	000 m³						€ million					
Sawn timber	389	564	658	619	534	601	54	51	85	83	73	81
Wood-based panels	614	580	660	616	630	665	195	147	179	173	179	199
000 tonnes												
Pulp products	2		1									
Paper and particle-board products	77	45	33	59	68	81	69	45	44	52	51	59
TOTAL							318	243	308	308	303	339

[32] Includes import/export figures for sawn timber, wood based panels and pulp/paper products only. Data taken from Ireland's Joint Forest Sector Questionnaire (JFSQ) returns (2009-2014). Roundwood, sawmill residues and secondary processed timber products are not included. Trade data for the JFSQ is provided by the Central Statistics Office(CSO): www.cso.ie.
Woodflow and forest-based biomass energy use on the island of Ireland (2013).COFORD Connects No.34. COFORD, Dublin.

5.4 Carbon stocks

Forests and forest sector polices play an important role in mitigating climate change by:

- afforestation and reforestation;
- forest management;
- controlling deforestation (land use change from forest to non-forest);
- the use of wood products to store carbon and displace emissions from energy intensive materials;
- Use of forest products for bioenergy to replace fossil fuel use.

In 1997, Ireland committed to maintain national greenhouse gases emissions at 13% above 1990 levels, as part of a legally-binding commitment under the Kyoto Protocol. Over the five years of the first commitment period of the Kyoto Period (i.e. 2008 to 2012), Ireland met its Kyoto obligations when forest carbon stock changes associated with afforestation and deforestation activities since 1990 were taken into account. Article 3.3 forests represented a net removal of over 16 Mt of CO_2 eq. from the atmosphere between 2008 and 2012, offsetting ca. 5 % of all national emissions.

The national forest estate is an important carbon reservoir, amounting to 381 million tonnes of carbon in 2012 as estimated from the 2nd cycle NFI. Carbon in biomass, deadwood and litter pools have increased between 2006 and 2012 (Table 22).

The carbon stock in forest soils is the dominant component, accounting for 85.1% of the carbon in the forest estate in 2012. Total living tree biomass amounted to 12.7% of the total carbon stock, while deadwood, including logs, stumps and standing dead trees along with litter constituted the remaining 2.2%.

Table 22. Forest carbon stocks 2006 and 2012.

	2006		2012	
Carbon Stock	Million t	% Total	Million t	% Total
Above-ground biomass*	30.6	8.9	39.7	10.4
Below-ground biomass**	6.7	1.9	8.8	2.3
Deadwood***	1.2	0.4	2.5	0.6
Litter	2.3	0.7	6.3	1.6
Soil	304.9	88.1	323.7	85.1
Total	348.4	100.0	381.0	100.0

* Above-ground biomass includes all living stems, branches and needles/leaves based on a stump height at 1% of total tree height.
** Below-ground biomass includes all roots to a minimum diameter of 5 mm.
*** Deadwood includes all logs, stumps and branches with a minimum diameter of 7 cm.

6. The Socio-Economic Contribution of the Forest Sector

6.1 Introduction

This Chapter provides information on the socio-economic contribution of forestry in Ireland in the following areas:

- The value of direct economic activity in the growing/harvesting subsector (excluding wood processing and related activities) and employment for the years 2003 and 2012;
- The value of total (Direct, Indirect and Induced) economic activity in the growing/harvesting subsector and employment for the years 2003 and 2012.

Key statistics

- An approximation of the full economic value of the forest sector in 2012 is €2.3 billion, when both indirect and induced effects are taken into account;
- The total GVA of the Forest sector was €1,096.5m in 2012;
- The total value of economic activity in the Growing/Harvesting sector in 2012 was €387m;
- For every €1 of economic activity generated in the growing and Harvesting subsector a further €0.78 is generated in the wider economy in 2012;
- The total value of economic activity in the wood processing sector in 2012 was €1389.1m;
- For every €1 of economic activity in wood processing an extra €0.66 is generated in the wider economy in 2012;
- The number of people employed directly in the forestry and logging sector has averaged 2,600 between 1998 and 2012;
- The overall value of both the growing and harvesting sub-sector and wood processing subsector has grown by 46% and 39% respectively since 2003;
- The number of people employed directly in the wood-processing subsector has decreased since the economic downturn in 2008;
- Over 18,000,000 forest visits took place in 2005;
- In 2013, €108 million was spent on planting grants, maintenance grants, annual premium payments and grant aid for forest roads.

6.2 Value of the Forest Sector

The total value of economic activity of the forest sector, both directly of itself and to the wider Irish economy, is shown in Table 23. The total direct value of economic activity in the Growing/Harvesting sub-sector in 2012 was €387m. Value to overall Gross Domestic Product or Gross Value Added (GVA) was €136.6m. In terms of the multiplier effect of this economic activity, for every €1 generated in the Growing/Harvesting sub-sector a further €0.78 was generated in the wider economy in 2012. This resulted in the growing and harvesting sub sector contributing an overall value of €688.7m to the wider Irish economy, an increase of €216m since 2003.

The total value of economic activity in the wood processing sub-sector in 2012 was €1389.1m. It added €391.6m in terms of GVA to the economy. For every €1 of economic activity in wood processing an extra €0.66 was generated in the wider economy, an increase of €79.3m over the 2003 figure. Total extra activity in the wider economy in 2012 was €910.3m (€2,299.4 – 1,389.1 m), an increase of €235 m since 2003.

The total GVA of the Forest sector was €1,096.5m in 2012. An approximation of the full economic value of the forest sector in 2012 is €2.3 billion, when both indirect and induced effects are taken into account.[33]

Table 23. Value of economic activity in the forestry sector.

Growing and Harvesting sub-sector		
	2003[34]	2012[35]
	Million, €	
Direct Economic Activity Value	255.4	386.9
Gross Value Added	134.5	136.6
Overall Value to Wider Irish Economy	472.4	688.7
Type 2 Multiplier	1.9	1.78
Wood processing sub-sector		
Direct Economic Activity Value	975.0	1389.1
Gross Value Added	312.3	391.6
Overall Value to Wider Irish Economy	1650.0	2299.4
Type 2 Multiplier		1.66

[33] *Annual Review and Outlook for Agriculture, Food and the Marine 2013/14*. Department of Agriculture, Food and the Marine.

[34] Ní Dhubháin, Á., Flechard, M., Moloney, R., O'Connor, D., Crowley, T., 2006. *The Socioeconomic Contribution of Forestry in Ireland – an Interdisciplinary Approach.* COFORD, Dublin.

[35] Personal Communication. Dr. Richard Moloney, 2014.

6.3 Employment in the forest sector

6.3.1 Categorisation of employment statistics

There is an EU wide nomenclature for the classification of economic activity, which is referred to as NACE. The class '**Forestry and Logging**' is most relevant for the purpose of this publication and includes the following four components[36]:

- Silviculture and other forestry activities;
- Logging;
- Gathering of wild growing non-wood products;
- Support services to forestry.

It is important to note that the Forestry and Logging class is concerned only with what occurs within the forest. Activities outside of the forest, such as transport of logs to a sawmill, are not included.

There is one other class which is relevant for this publication, '**Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials**'. This class can be broken into the following sub-categories:

- Sawmilling and planing of wood;
- Manufacture of products of wood, cork, straw and plaiting materials:
    - Manufacture of veneer sheets and wood-based panels;
    - Manufacture of assembled parquet floors;
    - Manufacture of other builders' carpentry and joinery;
    - Manufacture of wooden containers;
    - Manufacture of other products of wood; manufacture of articles of cork, straw and plaiting materials.

6.3.2 Quarterly National Household Survey

The Quarterly National Household Survey (QNHS) is a large-scale, nationwide survey of households in Ireland, which began in September 1997. It is designed to produce quarterly labour force estimates that include the official measure of employment and unemployment in the state. Each quarter field interviewers visit 39,000 households. In figure 25 below, average annual estimates are displayed.

The number of people employed directly in the forestry and logging sector has averaged 2,600 between 1998 and 2012 while the average number employed directly in sawmilling and planning of wood has averaged 7,855 for the same period.

[36] Detailed description of NACE codes at http://www.cso.ie/px/u/NACECoder/NACEItems/searchnace.asp

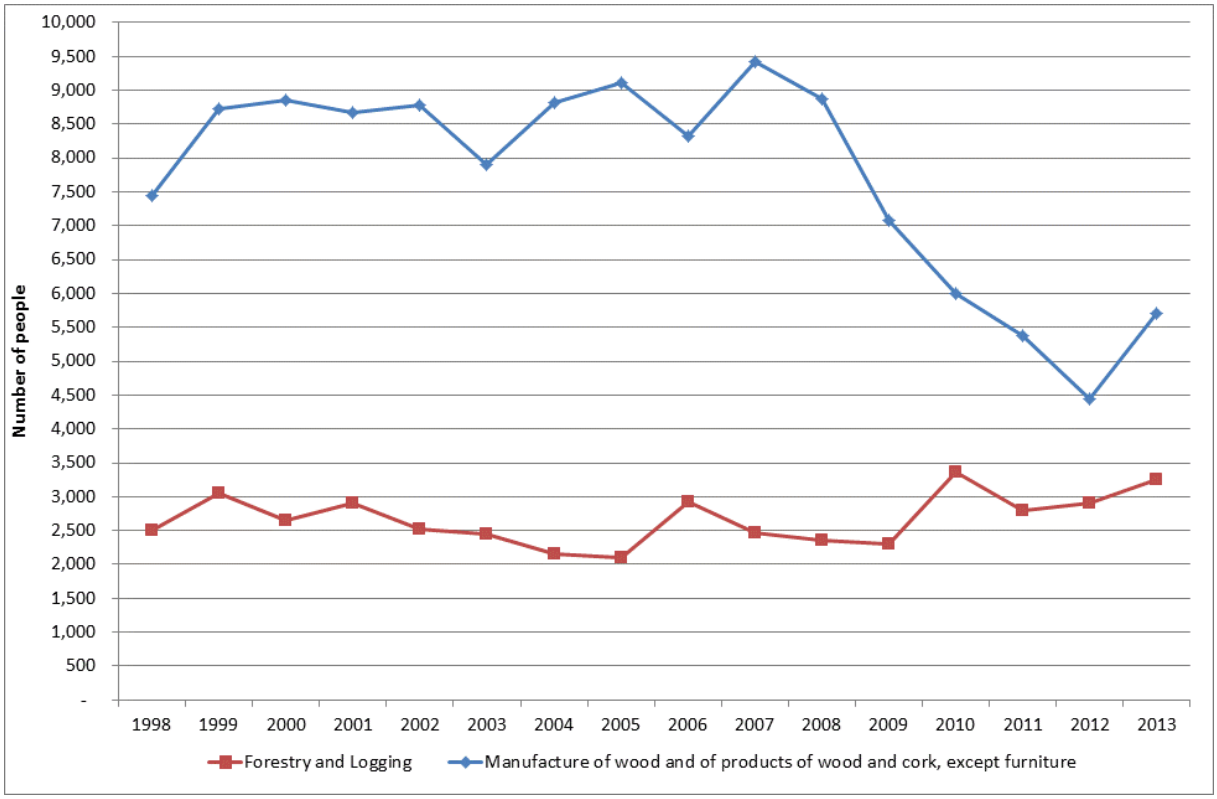

Figure 25. Quarterly National Household Survey labour force estimates 1998 to 2013.

6.3.3 Census of Ireland 2006 and 2011

The table below outlines persons aged 15 and over, classified by principal economic status and detailed industrial group involved in forestry, logging and related activities[37]. The sector is male dominated, with only 14% of the people female in 2011 (Table 24).

Table 24.Persons 15 years and over involved in forestry by principal economic status.

Forestry and Logging						
Census Year	Total in labour force	At Work			Unemployed (incl. looking for first regular job	Unemployment rate (%)
		Male	Female	Total		
2006	2,548	2,142	282	2,424	124	4.9
2011	2,308	1,761	269	2,030	278	12
Manufacture of wood and of products of wood and cork, except furniture						
Census Year	Total in labour force	At Work			Unemployed (incl. looking for first regular job	Unemployment rate (%)
		Male	Female	Total		
2006	6,188	5,168	752	5,920	268	4.3
2011	5,944	4,025	695	4,720	1224	20.6
Combined						
Census Year	Total in labour force	At Work			Unemployed (incl. looking for first regular job	Unemployment rate (%)
		Male	Female	Total		
2006	8,736	7,310	1,034	8,344	392	4.5
2011	8,252	5,786	964	6,750	1,502	18.2

[37] Source: http://www.cso.ie/en/media/csoie/census/documents/census2011profile3/Profile3_Statistical_Tables_and_Appendices.pdf

6.4 Forests & Recreation

The Forest Service has a policy of encouraging the use of forests for outdoor recreation. Table 26 shows an upward trend in visitor number to Irish forests between 1999 and 2005.

Table 25. Number of visits to Irish forests 1999, 2004 & 2005.

Year	Number of forest visits
1999[38]	8,500,000
2004[39]	11,000,000
2005[40]	18,000,000

Since the early 1970s there has been an active programme of providing recreational facilities in state forests. At the present time[41] there are 150 recreational sites and 11 forest parks in forests throughout the country. In addition to providing recreational sites such as picnic areas and trails, Coillte has an open forest policy that allows free public access to its 445,000 ha estate. The National Parks and Wildlife Service (NPWS) provide access to national parks and nature reserves, and arboreta managed by the Office of Public Works are open to the public. Also urban forests (public forests established and managed for recreation) owned by County Councils or local communities are quite intensively used being close to population centres.

For the private forest estate the decision to allow public access rests with the forest owner, and is provided on a goodwill basis[42]. Private forest owners who have availed of a roading grant in recent years must allow public access to the forest road.

[38] Clinch, P. (1999), *The Economics of Irish Forestry*, COFORD, Dublin

[39] Bacon, P. and Associates (2004). *A Review and Appraisal of Ireland's Forestry Development Strategy*, Final Report. Stationery Office, Dublin

[40] Fitzpatrick and Associates (2005). Economic Value of Trails and Forest Recreation in the Republic of Ireland. Coillte and the National Trails Strategy Working Group of the Irish Sports Council. Final Report, Dublin

[41] http://www.forestryfocus.ie/social-environmental-aspects/recreation/

[42] Forest Service. (2006). Forest Recreation in Ireland A Guide For Owners & Managers.

6.5 *Forest Service expenditure, 1993-2013*

Since 1993, €1.9 billion has been expended by the state on afforestation and other support measures for the forest sector. In 2013, €108 million was spent on forest activities including afforestation grants, maintenance grants, annual premium payments and grants for forest roading infrastructure (Figure 26). Expenditure in 2013 was a decrease of €1.5 million on the previous year. A detailed breakdown of expenditure by activity since 2007 is provided in Table 26.

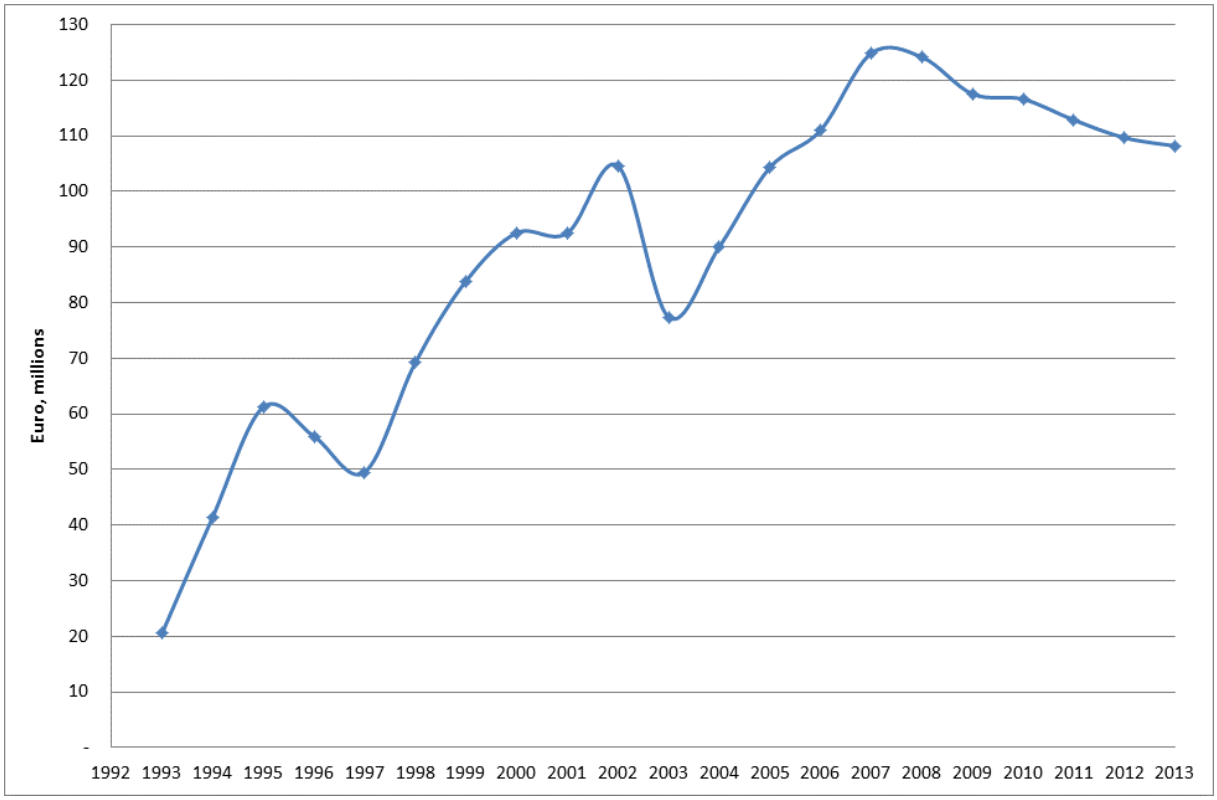

Figure 26. Total Forest Service expenditure 1993-2013.

Table 26. Forest service expenditure, 2007-2013.

Expenditure	2007	2008	2009	2010	2011	2012	2013
Main Afforestation Programme	000 €						
Grant - 1st Instalment	21,262	19,852	22,080	27,557	20,482	19,215	17,033
Grant - 2nd Instalment	10,515	9,470	8,675	7,441	7,697	6,334	7,291
Premium	70,306	74,264	70,496	72,285	75,005	75,685	76,013
Sundry (e.g. EU Debt Recoveries)	1,088	1,192	1,075	505	647	379	523
Afforestation Programme Total	**103,171**	**104,778**	**102,326**	**107,789**	**103,831**	**101,614**	**100,860**
Forest Roads-Harvesting	7,517	7,129	5,400	3,694	4,204	3,077	2,709
Reconstitution of Woodlands	1,579	2,108	790	966	827	567	257
Chalara reconstitution	0	0	0	0	0	0	693
Woodland Improvement Scheme	390	233	374	248	164	70	65
Thinning & Tending Scheme	0	0	0	610	750	971	864
Shaping of Broadleaves	52	57	83	10	0	0	0
Pruning of Conifers	130	189	454	56	0	233	94
NeighbourWood	76	578	670	180	351	435	146
Native Woodland Conservation	3,763	1,724	851	819	829	1,221	845
NDP Other Measures	412	170	52	3	11	-2	0
Support Schemes Total	**13,919**	**12,187**	**8,674**	**6,587**	**7,136**	**6,573**	**5,673**
Reforestation	4	8	4	13	11	0	5
Forest Inventory	106	69	15	7	69	41	30
Total Capital	**117,201**	**117,041**	**111,018**	**114,395**	**111,048**	**108,227**	**106,568**
Promotion	2,047	1,738	487	289	864	799	828
Training	963	820	1,122	954	226	105	80
Technical Support	303	379	752	393	92	85	232
Fees International Organisations	37	31	37	39	189	8	16
Sector Development (COFORD)	4,169	4,258	4,289	401[43]	408	380	425
Total Current	7,520	7,226	6,687	2,077	1,778	1,377	1,581
Total	**124,720**	**124,268**	**117,705**	**116,472**	**112,826**	**109,605**	**108,149**
Miscellaneous	99	-123	-195	94	4	41	20
Overall Total	**124,819**	**124,145**	**117,510**	**116,566**	**112,830**	**109,646**	**108,169**

[43] The research budget was transferred to Research and Codex Division from 2010.

7. Forest Protection and Health

7.1 Introduction

One of the key objectives of the Forest Service is to implement the forestry aspects of the EU plant Health Directive 2000/29/EC which includes monitoring and control programmes for harmful forestry pests and diseases. In this regard with increased levels and new emerging patterns in trade and greater mobility of larger numbers of people, the risk from the introduction of exotic pests and diseases is ever present. Damage may also be caused to forests by abiotic factors, with fire and wind the most common cause.

The majority of forests in Ireland are established using planting stock and ensuring the traceability, suitability and quality of forest seed and plants used is vitally important. The Forest Service has responsibility for the implementation of the Council Directive 1999/105/EC on the marketing of forest reproductive material and the associated implementing regulations as well as the being the designated authority in Ireland for the OECD Scheme for the Certification of Forest Reproductive Material Moving in International Trade.

The Forest Service also oversee the national implementation of the FAO, IPPC International Standard for Phytosanitary Measures (ISPM) No. 15, Guidelines for Regulating Wood Packaging Material in International Trade. Not only is this important in terms of imports and protecting Ireland's forests but also for companies exporting who require compliant wood packaging, thereby facilitating Irish exports of goods of all kinds.

Key statistics

- No harmful pests or diseases for which Ireland has current EU Protected Zone status have been detected in Irish forests during annual surveys;
- Based on Forest Service surveys new Protected Zone status has been granted in 2014 by the European Commission for two additional harmful organisms: *Thaumetopoea processionae* (oak processionary moth) and *Dryocosmus kuriphilus* (oriential chestnut gall wasp);
- Following the first detection of *Chalara fraxinea* in Ireland in October 2012, the disease has been confirmed present on imported ash at a total of 54 plantations;
- To date the disease has been detected in native hedgerow ash at 4 locations previously associated with infected imported ash trees;
- *Phytophthora ramorum* was first detected in Japanese larch in 2010 and has since been confirmed present at a total of 42 locations in this tree species;
- In 2010/2011, fire damage peaked at 1500ha. Low levels of damage were experienced in 2012/2013 with levels not exceeding 400ha;
- The extent of wind damage following Storm Darwin in February 2014 was estimated to be approximately 8000 ha (+/- 560ha) with counties Kerry, Limerick, Cork and Clare most severely affected;
- 69 Seed Collection Permits and 12 Master Certificates of Provenance were issued in 2014 in relation to home collected forest reproductive material;
- 47 Irish companies are currently registered in Ireland to produce wood packaging material to the FAO IPPC International Standard for the Regulation of Wood Packaging Material in International Trade (ISPM No. 15) thus facilitating the export of goods worldwide from Ireland on compliant pallets and crates.

7.2 Biotic – Pests and Diseases

The Forest Service is responsible for implementing the forestry aspects of the EU Plant Health Directive, Council Directive 2000/29/EC on protective measures against the introduction into the Community of organisms harmful to plants or plant products and against their spread within the Community. This Directive has recently been reformed by the European Commission and the Standing Committee on Plant Health in Brussels which is regularly attended by the Forest Service at its monthly meetings. Under the EU Plant Health Directive for logistical plant health reasons the island of Ireland is considered as a whole. As a result there is close co-operation with Northern Ireland's Department of Agriculture and Rural Development involving regular meetings of the North South Ministerial Council and the Plant Health Sub-Group.

The Forest Service implements the provisions of the Directive relating to timber, wood packaging material (pallets, crates, etc.), forest plants, Christmas trees and other forest products and surveys the national forest estate for quarantine forest pests and diseases.

7.2.1 Protected Zone Organisms

Ireland has Protected Zone status for 13 harmful organisms present in other EU Member States but not present here (Table 27). In accordance with Commission Regulation EC No 690/2008 to justify Ireland's Protected Zone status, the Forest Service conducts annual national forest surveys and submits reports annually to European Commission.

Table 27 Protected Zone Survey results 2012-2014

Protected Zone Organism	**Forest Detections by Year**		
	2012	**2013**	**2014**
Cephalcia lariciphila (European web-spinning larch sawfly)	0	0	0
Gilpinia hercyniae (European spruce sawfly)	0	0	0
Gremmeniella abietina (Brunchorstia disease)	0	0	0
Dendroctonus micans (great spruce bark beetle)	0	0	0
Ips amitinus (small spruce bark beetle)	0	0	0
Ips cembrae (large larch bark beetle)	0	0	0
Ips duplicatus (northern bark beetle)	0	0	0
Ips sexdentatus (six-tooted bark beetle)	0	0	0
Ips typographus (eight-tooted spruce bark beetle)	0	0	0
Hypoxylon mammatum (hypoxylon canker)	0	0	0
Cryphonectria parasitica (chestnut blight)	0	0	0
Thaumetopoea processionae (oak processionary moth)*	0	0	0
Dryocosmus kuriphilus (oriental chestnut gall wasp)*	0	0	0

*During 2014 Ireland was granted Protected Zone status for two additional pests, *Thaumetopoea processionae* (oak processionary moth) and *Dryocosmus kuriphilus* (oriential chestnut gall wasp) based on previous annual surveys where no detections were made.

7.2.2 Other Regulated Organisms

Other harmful organisms listed in the EU Plant Health Directive of significance which also require mandatory annual surveys and reporting include *Anoplophora chinensis* (citrus long-horn beetle), *Bursaphelenchus xylophilus* (pine wood nematode), *Monochamus spp*. (sawyer beetle), *Phytophthora ramorum* and *Gibberella circinata* (pitch canker of pine).

7.2.3 Surveys

Surveys for the above regulated organisms and for general forest health monitoring purposes, a network of observation points, pheromone traps, bait logs and sampling points distributed around the country in public and private forests and forest nurseries are used. The Forest Service also deals with queries and reports from the industry and general public in relation to forest and tree health issues. This may involve site visits and taking of samples for laboratory analysis. This diagnostic and advisory service is part of the National Forest Protection Policy. During 2014 in excess of 600 ground site visits were conducted for specific plant health reasons (official EU surveys, Chalara ash dieback survey and reported site follow ups etc). With the exception of *Phytophthora ramorum* and *Chalara fraxinea* (not a regulated disease under the EU Plant Health Directive) there have been no confirmed findings of any other regulated or serious forest pests or diseases.

7.2.4 Chalara Ash Dieback (Chalara fraxinea/ Hymenoscyphus fraxineus)

Following the first confirmed finding of the disease in October 2012 on imported trees used in a forestry plantation surveys for the disease were intensified. In addition to forest surveys, staff in the wider Department also surveyed horticultural nurseries, garden centres, private gardens, roadside landscaping and farm agri-environment scheme plantings where findings were made in all categories. During 2014 the Department continued to survey for the disease. This included a targeted survey in the environs of previously confirmed positive forestry plantations (48 locations) and a systematic survey of 357 National Forest Inventory points (211 hedgerows and 146 forest locations) across the country. The position as of 31 October 2014 regarding the total number of confirmed findings in comparison to those at the end of 2013 are outlined in Table 28 below.

Table 28. Overview of Number and Type of Confirmed Chalara Findings

Location type	Number of confirmed findings October 2012 to 31/12/2013	Number of confirmed findings 1/1/2014 to 31/10/2014
Horticultural nurseries	17	3
Garden centres	4	0
Private gardens	4	3
Farm planting / Agri-environmental planting	21	2
Roadside planting	24	7
Hedgerow *	2	2
Forest Plantations	41	13
Total	**113**	**30**

*Hedgerow positives are all associated with infected sites.

To date 693 hectares of infected and associated ash plantations have been cleared and replanted with alternative species. This has involved the removal and destruction of circa 2 million ash trees since October 2012 at a cost of €1.75 million.

While *Chalara fraxinea* is not a regulated disease under the EU Plant Health Directive (Council Directive 2000/29/EC) a Ministerial Order was introduced on the 6th November 2012 (S.I. 431 of 2012) to restrict the movement of ash plants and seed into Ireland. The provisions also include restrictions on ash wood imports. This order provides for measures to prevent the spread of *Chalara fraxinea* in the genus *Fraxinus* L.. Following the introduction of these measures, an 'All Ireland Chalara Control Strategy' was published in July 2013. This strategy

was developed jointly with Northern Ireland's Department of Agriculture and Rural Development. The Department also co-operated with the UK authorities in inputting in a 'Pest Risk Analysis for *Hymenoscyphus pseudoalbidus* for the UK and the Republic of Ireland'. *H. pseudoalbidus* was the name given to the harmful sexual stage of the organism's life cycle when it was first identified in 2011. The organism was renamed *H. fraxineus* in 2014. The Forest Service also continues to participate in the European Cooperation in Science and Technology (COST) funded action into the disease (FP1103 FRAXBACK www.fraxback.eu).

7.2.5 Phytophthora ramorum

Since the first finding in Ireland *of Phytophthora ramorum* in Japanese larch in 2010 the Forest Service has continued to conduct annual ground and aerial surveys of larch with the assistance of the Air Corps and Coillte. At the start of 2014 the disease had been confirmed present in Japanese larch at 26 locations, up from 16 at the start of the previous year. Up to 31 October 2014 the disease has been confirmed present at an additional 16 locations, bringing the total number of confirmed locations to 42 affecting approximately 300ha of forestry (Table 29). Since 2010 the Forest Service have being working primarily with Coillte as the principle landowner affected in undertaking sanitation felling of infected larch in an effort to limit spread.

Table 29. No of confirmed site findings in Japanese larch.

Year	**Number of confirmed new findings**
2010	8
2011	4
2012	4
2013	10
2014 (up to 31 October)	16

The disease has also been detected during forest surveys on beech, noble fir, Spanish chestnut, *Vaccinium myrtillus* and *Gaultheria shallon* (first world finding in the wild) growing in close proximity to infected Japanese larch. While previous Forest Service surveys detected the disease for the first time worldwide on a single Sitka spruce and European silver fir tree, no subsequent findings have been detected here. However, surveys continue to detect the disease in wild invasive rhododendron, with two new locations detected in 2014 in addition to the 24 findings previously detected. *Phytophthora kernoviae* has also been detected by the Forest Service in 8 locations on wild rhododendron. To date all confirmed findings of the disease in Japanese larch have been limited to counties Wicklow, Wexford, Kilkenny, Tipperary, Waterford, Cork and Kerry.

During 2014 the Forest Service in co-operation with the Department of Agriculture and Rural Development in Northern Ireland developed a protocol to facilitate the cross border movement of logs from outbreak areas to licensed mills to facilitate additional access to processing capacity under strict bio-security protocols.

7.3 Abiotic – Fire and Wind

This section details the extent of damage to the forest estate arising from non-living or abiotic sources.

7.3.1 Forest fires

Forest fires normally occur each year in Ireland and reach their peak in spring, particularly in forests established on formerly unenclosed land, with a preponderance of purple moor grass and heather vegetation. Figure 27 shows the area of forests damaged by fire from 1930 to 2013. In the late 70s and early 80s considerable areas of public forest were burnt. The scale of fire damage in public forests has decreased in recent years. However fire damage levels were high in both public and private forests in 2010 and 2011 following protracted dry periods in spring.

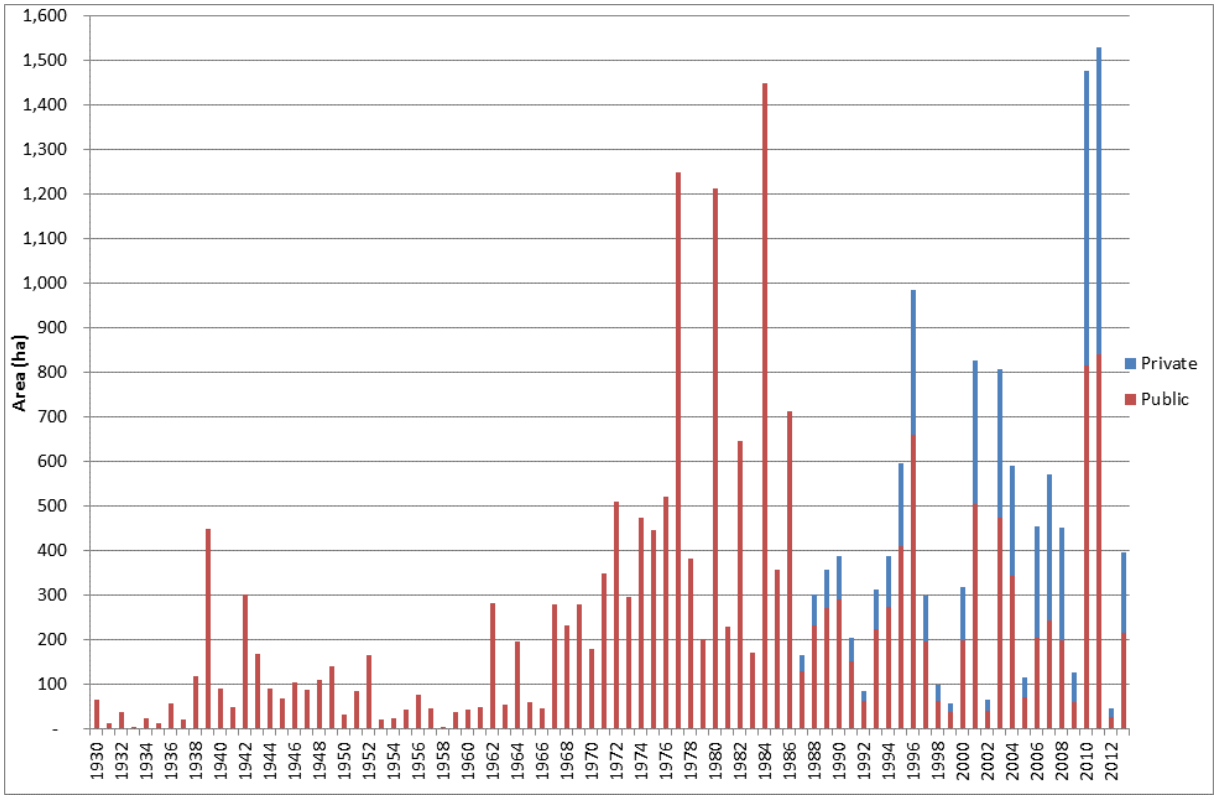

Figure 27. Area of forest damaged by fire 1930-2013[44]

[44] Estimates of fires in privately-owned forests 1985-2005, were derived from the proportion of private forest area to public forest area.

7.3.2 Windthrow

The 2012 NFI indicated that there are 8,000 ha of forest windblown in Ireland. This area includes small pockets of windthrow as well as the larger forest areas that experienced catastrophic damage. There is no annual record of historic wind blow available.

Storm Darwin, February 2014

Storm force winds occurred on 12 separate days between the 5th December 2013 and the 12th February 2014. This series of storms led to a large increase in rainfall on land throughout the country that was already heavily saturated. The most severe windstorm named 'Storm Darwin', occurred on the 12th February 2014 and was associated with an active depression off the south coast that tracked steadily north-eastwards over the country.

Generally, storm events in Ireland do not give rise to large scale damage in our forests. However, the frequency and ferocity of the recent storm events, compounded by waterlogged soils on many sites, has led to extensive damage. While initial estimates put the area damaged at less than 1% of the total forest area, locally the damage has been severe, with significant volumes of roundwood impacted.

While initial estimates put the area damaged at less than 1% of the total forest area (5-7,000ha), a more robust estimate was required. Coillte undertook a review of techniques that would facilitate the rapid assessment of the storm damage. A decision was made to use RapidEye satellite imagery. One of the principal reasons for selecting satellite imagery was that it provides a synoptic view of the landscape; is cheaper, more efficient and safer than field-based mapping and allows for retrospective analysis.

RapidEye is a German/Canadian constellation of 5 optical Very High Resolution Sensors that acquires imagery with a spatial resolution of 5 m. A semi-automated supervised classification was developed and implemented by Coillte to map wind damage within the national forest estate. A post-processing step was carried out using Bing imagery for quality control.

The extent of wind damage was estimated to be approximately 8,000 ha (+/- 560ha) with counties Kerry, Limerick, Cork and Clare most severely affected (Figure 28). The overall accuracy of the wind damage dataset is estimated at 89%.

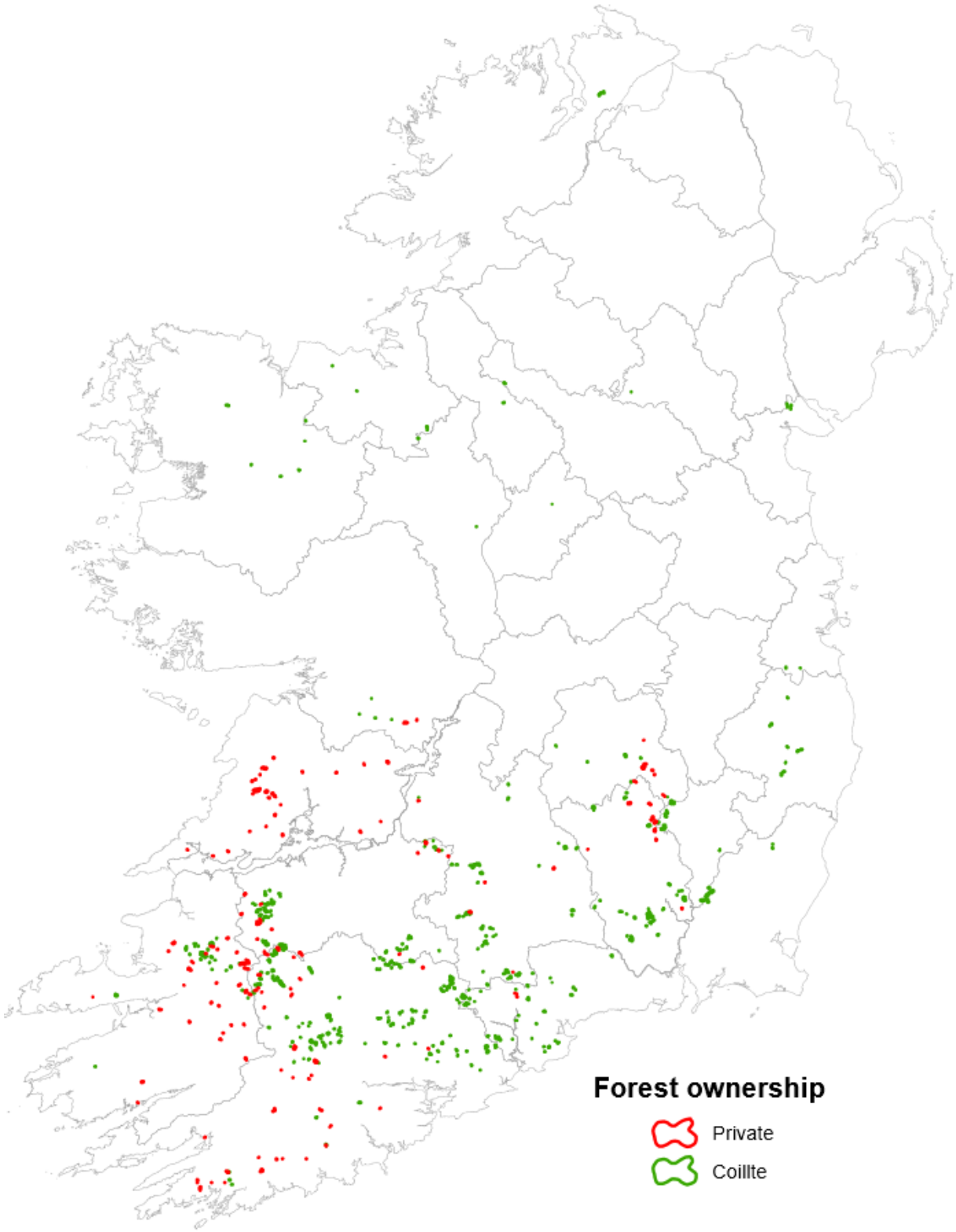

Figure 28. Distribution of damage to the forest estate following Storm Darwin, February 2014.

7.4 International Trade

The Forest Service conduct import inspections of wood and wood products from Third Countries regulated under the EU Plant Health Directive to ensure compliance with entry requirements as part of the Customs clearance process. Under the EU internal markets regime goods coming from within the EU are not subject to Customs clearance- but monitored to ensure Ireland's Protected Zone requirements are met. The Forest Service operates two designated Border Inspection Posts in Dublin and Cork ports for import controls from Third countries and has an office in Waterford port. Shipments coming into the other ports and airports are covered from these locations if required. While non-compliance is infrequent, in recent years interceptions of note include wood packaging material infested with *Bursaphelenchus xylophilus* (pine wood nematode) and *Ips typographus* (eight-tooted spruce bark beetle). A large bulk shipment import of conifer wood chip inspected prior to discharge was also found to be non- compliant with the Protected Zone requirements and re-exported.

During 2013 the European Commission introduced special measures regarding inspections of wood packaging material associated with certain stone commodities imported into the EU from China. To date over 170 containerised consignments have been inspected, with two non-compliances detected and refused entry (one of the consignments was heavily infested with live longhorn larvae). In addition Forest Service carries out monitoring of Portuguese wood packaging material in relation to the treat of pine wood nematode.

The Forest Service also provide advice and deal with queries regarding import and export requirements related to wood/wood products and forest reproductive material. Phytosanitary Certificates may also be issued to accompany certain consignments leaving the free trade area of the EU.

7.5 Forest Reproductive Material

The Forest Service is responsible for implementing Council Directive 1999/105/EC on the marketing of forest reproductive material. Forest reproductive material (FRM) is a collective term to describe seeds, plants and cuttings, which are important for forestry purposes. The aim of the legislation is to ensure that forest reproductive material, which is marketed, is from approved suitable sources and is clearly labeled and identified throughout the entire process from tree seed collection to processing, storage, forest nursery production and delivery to the final forest user. In recent years the Forest Service has being participating in the ongoing EU review of seed and propagating material legislation.

The Forest Service provides the following services in relation to forest reproductive material:

- Registration of suppliers of forest reproductive material - seed collectors, nurseries, seed and plant importers and brokers
- Registration of seed stands with the assistance of COFORD
- Issuing of Certificates of Provenance for seed collections
- Advice on forest seed and plant regulations

In 2014 the Forest Service issued 69 Seed Collection Permits up slightly from the previous year (66 issued in 2013). During the same period 12 Master Certificate of Provenance were issued in 2014 (73 issued in 2013). These figures vary from year to year depending on availability of suitable seed and levels of demand.

The Forest Service is also the National Designated Authority in Ireland for the OECD Scheme for the Certification of Forest Reproductive Material Moving in International Trade. The object of the international OECD Scheme is to encourage the production and use of forest seeds, parts of plants and plants that have been collected, transported, processed, raised and distributed in a manner that ensures their trueness to name. During 2013 Ireland deputised for the Lithuanian EU Presidency at the annual OECD meeting.

Forest plants may also be subject to the requirements of the EU Plant Health Directive, Council Directive 2000/29/EC on protective measures against the introduction into the Community of organisms harmful to plants or plant products and against their spread within the Community.

7.6 ISPM No. 15 (IPPC International Standard for Wood Packaging Material)

In relation to exports (in addition to import controls), the Forest Service is responsible for the implementation of the FAO, IPPC, International Standard for Phytosanitary Measures (ISPM) No. 15, Guidelines for Regulating Wood Packaging Material in International Trade. ISPM No. 15 describes phytosanitary measures to reduce the risk of introduction and/or spread of quarantine pests associated with wood packaging material made of raw wood, in use in international trade.

Wood packaging material, which is being exported from Ireland to most non-EU countries around the world, is required to comply with ISPM No. 15. ISPM No. 15 thereby facilitates exports by Irish companies of goods of all kinds, which are being transported using wooden pallets, crates, loose wood dunnage etc. In practice wood packaging material made from unprocessed raw wood and used in supporting, protecting or carrying a commodity, must be heat treated or fumigated in a specified manner and each individual unit of the wood packaging material must be stamped on at least two sides with the officially approved ISPM No. 15 mark verifying the treatment and incorporating the country code and the registration number of the producer of the packaging.

ISPM No. 15 currently does not apply to wood packaging material which is being dispatched to other EU Member States. The following services are available in relation to ISPM No. 15:

- Registration of producers of wood packaging material and kiln operators in association with NSAI
- Advice to wood packaging material manufacturers and kiln operators concerning ISPM No. 15
- Advice to importing and exporting companies concerning ISPM No. 15

Currently 47 companies are registered to operate under the scheme in Ireland with 3 new company registered in 2014. Companies in the scheme are inspected to ensure compliance with agreed Standard Operating Procedures and that the wood packaging material is fully compliant with the standard.

8. International comparators

8.1 Introduction

This chapter contains information international forest cover and other key statistics such as increment are presented. Information is primarily presented on forests in the EU 28.

Key statistics

- Forest cover in Ireland, at 10.5% in 2012 is one of the lowest in the EU where the average is 33.5%; Worldwide forest cover is 31%;
- Ireland, at 54% is close to the EU average of 59% for public forest ownership;
- Annual roundwood harvest at 2.7 million m^3 in 2010 compares a with an EU average of 18.9 million m^3 in the same year;
- Fellings represented at 47% of annual increment in 2012, which is below the EU average of 59%, which is a reflection of the relatively young age of Ireland's forests in comparison to the rest of the Europe;
- Since 1990 Ireland has had the highest rate of increase in forest cover among EU Member States.

8.2 Global Forest Cover

Despite having afforested 294,000 ha since 1990, Ireland remains one of the least forested countries in Europe, with just 10.5% forest cover (Table 30, Figures 29 & 30). This compares with 33.5% for the EU 28 and 31% worldwide.

Table 30. Forest cover EU and global (Source: FAO Global Forest Resources Assessment 2010)

Country/World Region	Forest area 1,000 ha	Forest as % of land area
Ireland (NFI, 2012)	731	10.5
Netherlands	365	10.8
Finland	22,084	72.6
France	15,954	29.0
Germany	11,076	31.8
Spain	18,173	36.4
Sweden	28,605	69.7
United Kingdom (2012)	3,097	12.8
Other EU	59,238	33.5
Total EU 28	159,323	34.4
Russian Federation	809,090	49.4
Total Europe	1,019,940	44.5
Africa	674,419	23.0
Asia	593,512	19.0
North & Central America	705,393	33.0
Oceania	191,384	23.0
South America	864,351	49.0
World	4,033,060	31.0

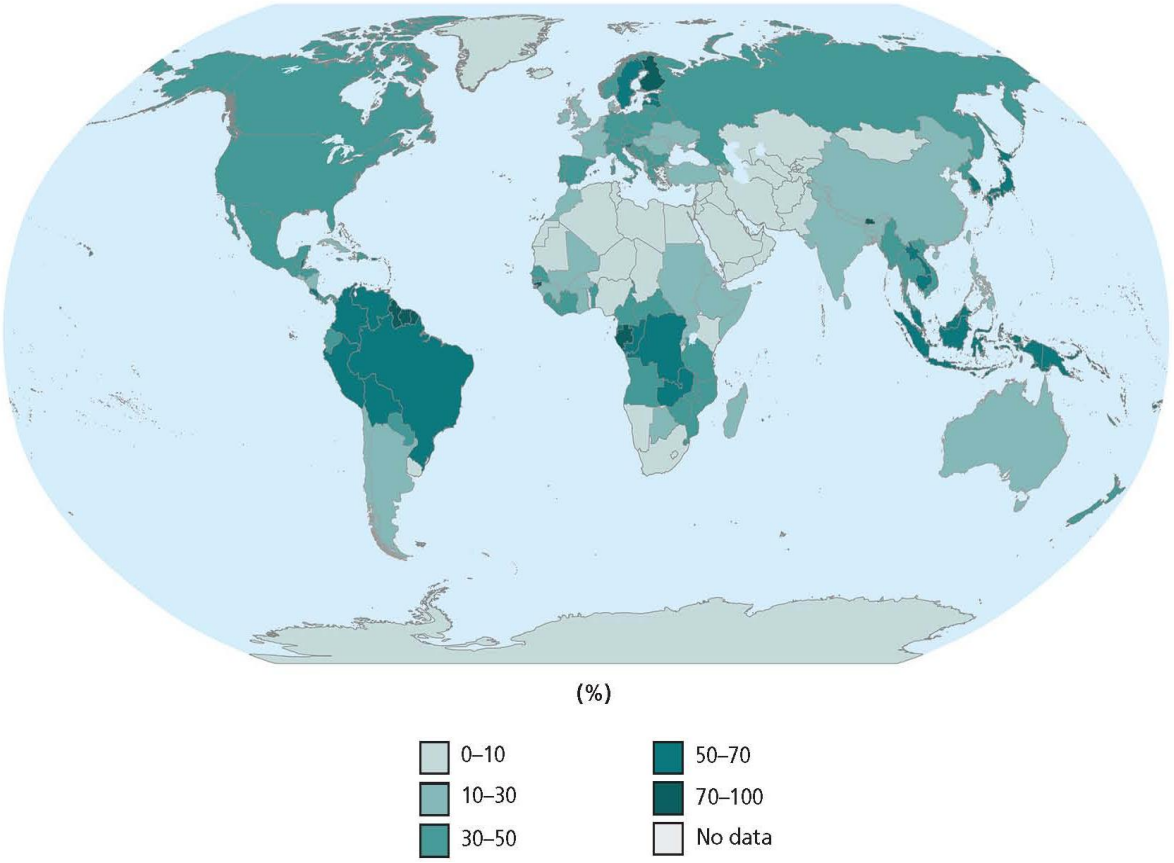

Figure 29. Global forest cover , 2010. (Source: FAO Global Forest Resources Assessment 2010)

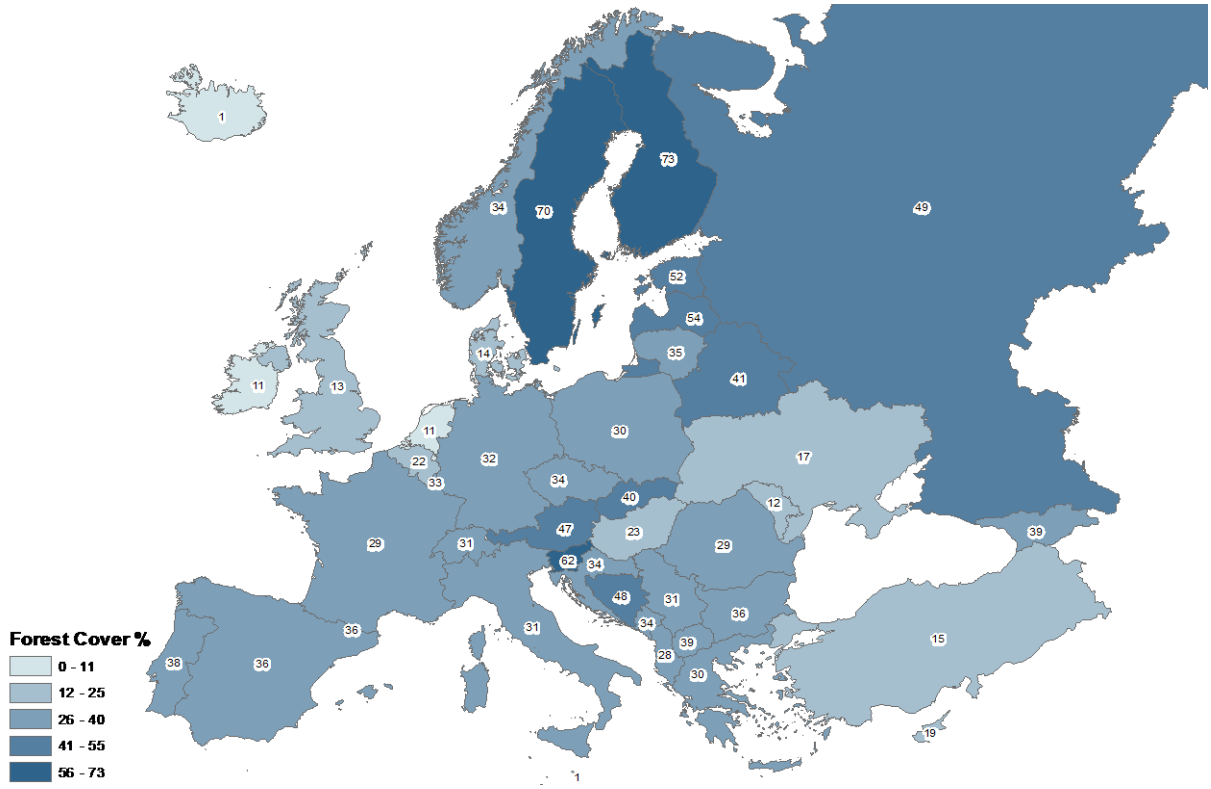

Figure 30. Forest cover in Europe

8.3 Forest comparison: EU 28[45]

Public forest ownership in Ireland at 54% is close to the EU average of 59% (Figure 31). Due to afforestation, the proportion of privately owned forest is increasing in Ireland. Germany has the highest total growing stock of the EU 28, at over 3.4 billion m^3 (Figure 32).

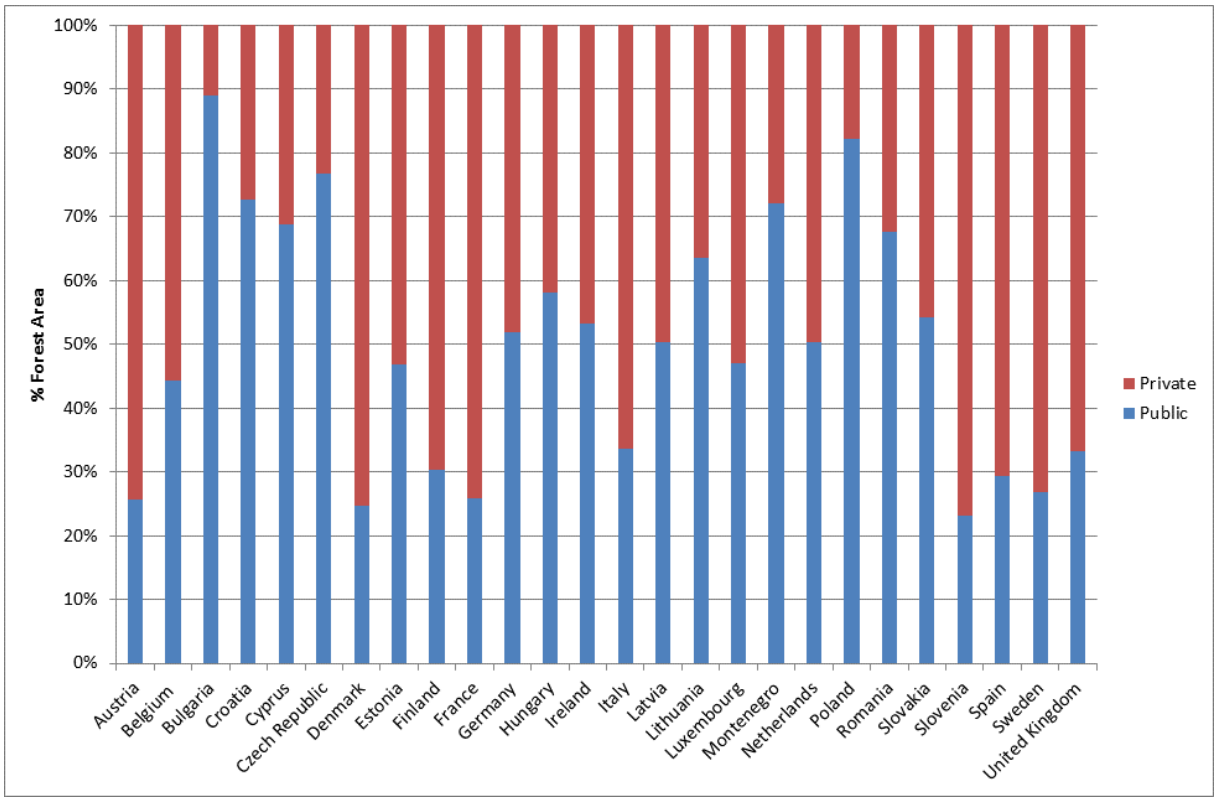

Figure 31. Forest ownership in the EU 28 (where available), 2010.

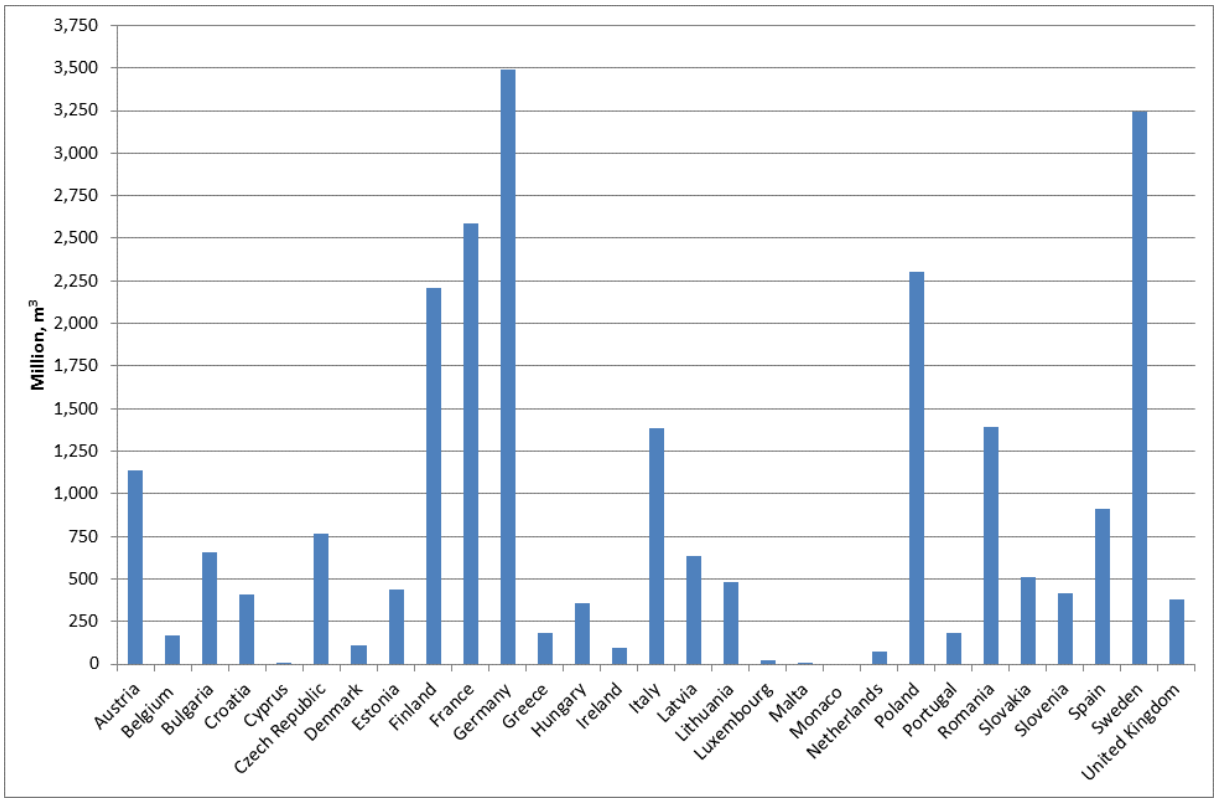

Figure 32. Growing stock in the EU 28 countries (where available), 2010.

[45] NFI 2012 used for Ireland and State of Europe's Forests 2011

Annual roundwood harvest at 2.7 million m³ in 2010 compares with an EU average of 18.9 million m³ in the same year (Figure 33). Fellings represented at 47% of annual increment in 2010, which is below the EU average of 59% (Figure 34), which is a reflection of the relatively young age of Ireland's forests in comparison to the rest of the Europe.

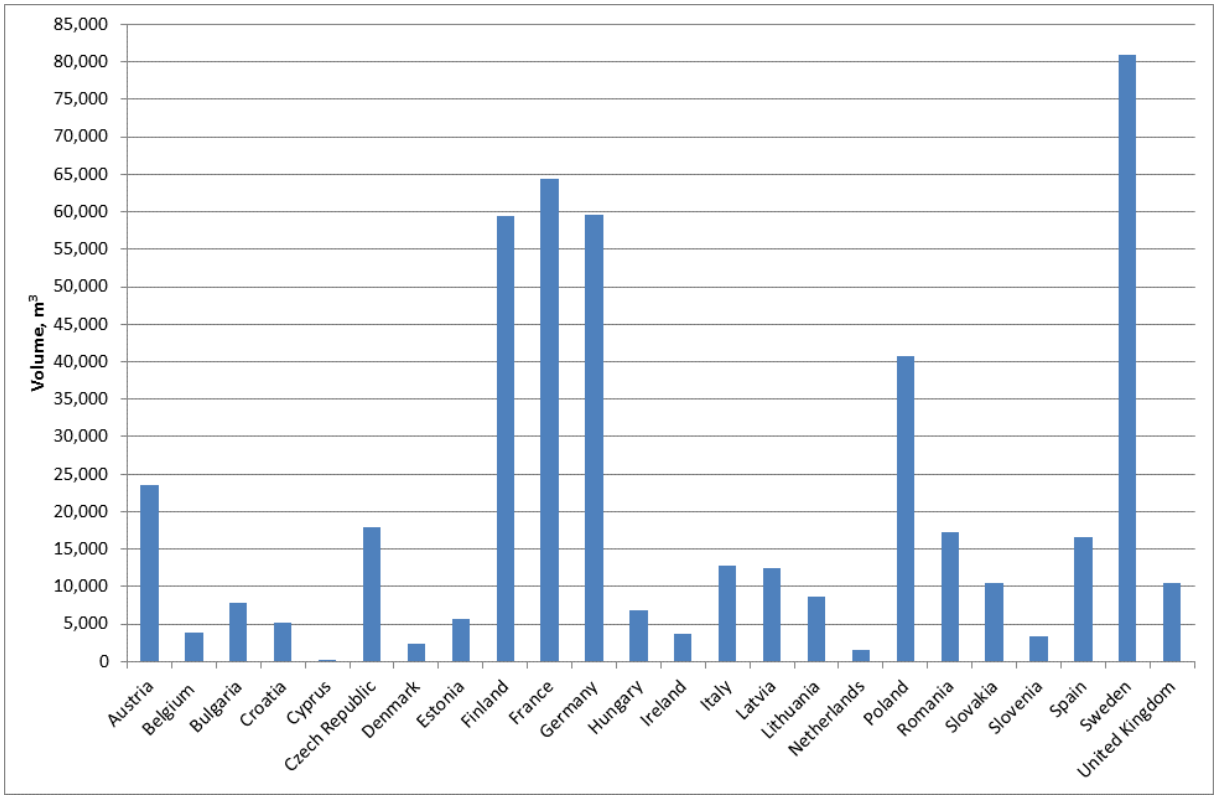

Figure 33. Felling volumes in the EU, 2010.

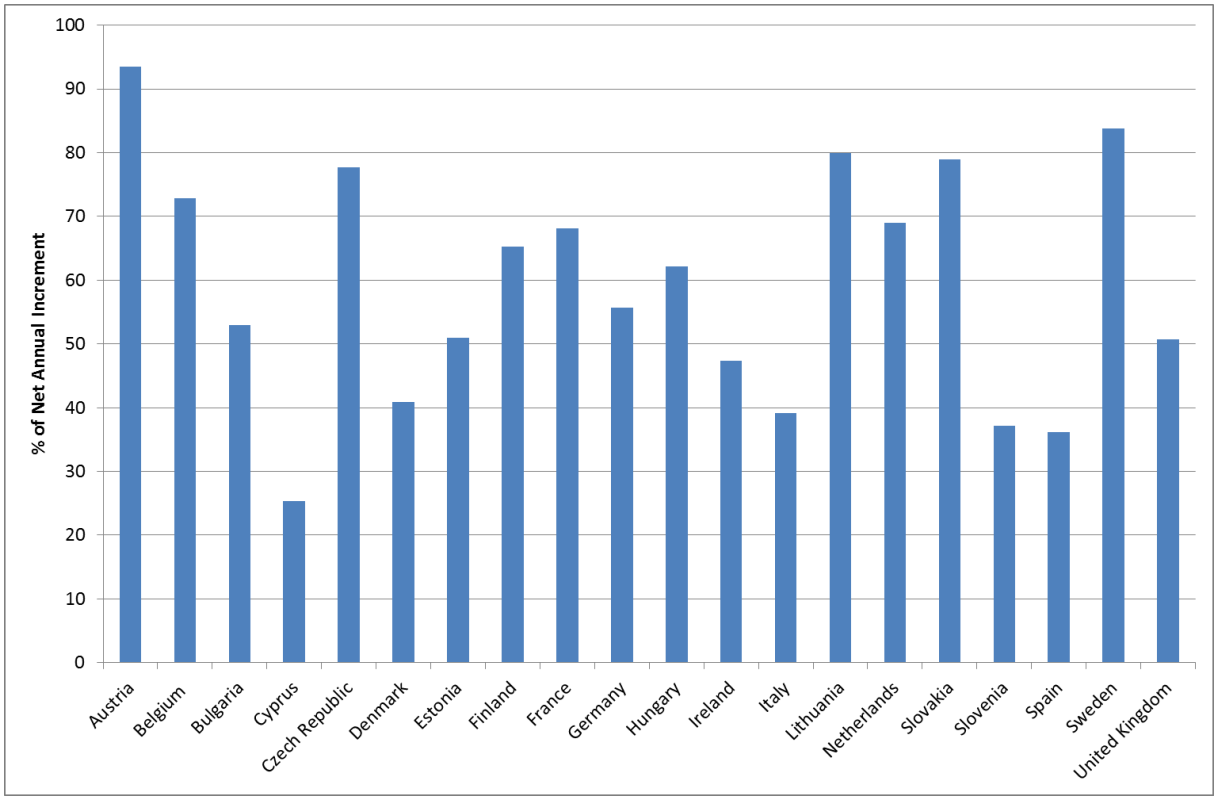

Figure 34. Harvest as a percentage of net annual increment.

8.4 European Afforestation Rates

According to the FRA, since 1990 Ireland has had the highest rate of increase in forest cover among EU Member States, and one of the highest in Europe as whole (Table 31).

Table 31. Change in extent of forest, 1990-2010.

Country/area	Annual change rate					
	1990-2000		2000-2005		2005-2010	
	1,000 ha/yr	%[a]	1,000 ha/yr	%[a]	1,000 ha/yr	%[a]
Andorra	0	0	0	0	0	0
Austria	6	0.16	5	0.12	5	0.13
Belarus	49	0.62	33	0.39	39	0.46
Belgium	-1	-0.15	1	0.16	1	0.15
Bosnia and Herzegovina	-3	-0.11	0	0	0	0
Bulgaria	5	0.14	55	1.58	55	1.47
Croatia	4	0.19	4	0.19	3	0.18
Czech Republic	1	0.03	2	0.08	2	0.08
Denmark	4	0.89	10	1.9	2	0.37
Estonia	15	0.71	2	0.08	-7	-0.31
Finland	57	0.26	-60	-0.27	0	0
France	82	0.55	72	0.47	48	0.3
Germany	34	0.31	0	0	0	0
Greece	30	0.88	30	0.82	30	0.79
Guernsey	0	0	0	0	0	0
Hungary	11	0.57	15	0.78	9	0.46
Iceland	1	7.78	1	6.66	1	3.32
Ireland	17	3.16	12	1.82	9	1.24
Isle of Man	0	0	0	0	0	0
Italy	78	0.98	78	0.92	78	0.88
Jersey	0	0	0	0	0	0
Latvia	7	0.21	11	0.34	11	0.34
Liechtenstein	n.s.	0.6	0	0	0	0
Lithuania	8	0.38	20	0.98	8	0.37
Luxembourg	n.s.	0.11	0	0	0	0
Malta	0	0	0	0	0	0
Montenegro	0	0	0	0	0	0
Netherlands	2	0.43	1	0.28	0	0
Norway	17	0.19	76	0.81	76	0.78
Poland	18	0.2	28	0.31	27	0.3
Portugal	9	0.28	3	0.1	4	0.11
Republic of Moldova	1	0.16	8	2.3	5	1.24
Romania	-1	-0.01	5	0.08	36	0.56
Russian Federation	32	n.s.	-96	-0.01	60	0.01
Serbia	15	0.62	3	0.13	47	1.85
Slovakia	n.s.	-0.01	2	0.11	n.s.	0.01
Slovenia	5	0.37	2	0.16	2	0.16
Spain	317	2.09	61	0.36	176	1
Sweden	11	0.04	163	0.59	0	0
Switzerland	4	0.37	5	0.38	5	0.38
The former Yugoslav Republic of Macedonia	5	0.49	3	0.35	5	0.47
Ukraine	24	0.25	13	0.14	26	0.27
United Kingdom	18	0.68	10	0.37	7	0.25

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